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# The alliances of the Athens stock exchange as an accelerative factor for the unification of the European Stock exchanges and the necessary steps to their complete unification

Despina C. Anargiridou\*, Prof. DR. Demetrios L. Papadopoulos\*\*

**Abstract** –The European stock markets remain fragmented and inefficient and their trading volumes tend to be lower. The purpose of this paper is twofold: first to provide a critical examination of the co-operations between the Greek and the other European stock exchanges and the stock exchanges of the wider region of Balkans as an accelerative factor for the unification of the European stock exchanges. Second, to describe the required further steps which should take place for the complete unification of the European stock markets.

## 1. Introduction and the Purpose of the paper

The launch of the EURO made transactions simpler. This single European currency has a great influence in bringing together the fragmented and disparate stock exchanges and bourses of Europe, allowing companies to deal and trade in one currency, removing all those other small inefficient exchanges.

Besides, pressure on European stock exchanges to consolidate has intensified due to the competition from U.S. markets. Financial institutions pressurize European stock exchanges to create a rival to Wall Street, which outpaced European bourses. Nasdaq is eager to expand in Europe. Recently, it unveiled a plan to create an Internet-based European network called Nasdaq-Europe.

In addition there will be some pressure from enterprises in emerging European countries to get access to western capital and to have links with a stock exchange where they can raise capital. So, the needs of European enterprises will forge alliances.

In the MBA thesis of the first author of this paper, which was supervised by the second author, we

have studied the unification of the European stock exchanges and we have developed a stock exchange platform for the pan-European stock exchange.

The purpose of this paper, which is based upon the above MBA Thesis, is twofold: **First** to study the co-operations and alliances between the Athens stock exchange and the other European stock exchanges and the stock exchanges of the wider region of Balkans. All these collaborations are an accelerative factor for the unification of the European stock markets. The leading role of our stock exchange for the management of the stock markets of the wider region of Balkans will obviously intensify the importance of its role in the EU. The co-operations of the Athens stock exchange and the consequences of the unification of the European stock markets for the Athens stock exchange are given in the second part of this paper.

**Second**, to describe the required further steps which should take place for the complete unification of the European stock markets. We investigated the factors that will lead to the complete unification

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of the European stock markets. We also studied the conclusions of the special Lisbon European Council as regards to the further steps for the stock markets unification. Besides, the harmonisation of the stock markets operational rules and platforms was another major part of our investigation. The great improvements in information technology and the Electronic Communication Networks were also examined as accelerative factors for the creation of a single electronic European stock market. The results of this investigation are discussed in the third part of this paper.

The last part (fourth) of paper presents our conclusions about the unification of the European stock markets and proposes the direction for further investigation that the issues related to the co-operations between the European stock markets should take.

## **2. The Collaborations of the Athens stock exchange with the other European stock exchanges as an Accelerative Factor for the Unification of the European Stock exchanges**

### **2.1. General comments**

The Greek stock market has already shown that it is ready to participate in the “umbrella” of the big mature stock markets that’s why it has come in contacts with many European stock exchanges. We have to notice that the purpose of all these contacts is the promotion of co-operations and the examination of how possible is the participation of the Athens Stock Exchange (ASE) in an alliance, as the ones that they are formed in the European Union (EU).

The impression is that the stock market scene has not cleared yet and announcements regarding new initiatives, which the ASE is monitoring, are expected. It is critical important for our country to take part in alliances with other European stock exchanges, in order to facilitate capital investments and to strengthen its effectiveness.

In the rest of this paragraph, we will discuss all forms of collaborations among the Athens stock market and the other European stock markets. We will also present the collaborations among the ASE and the stock markets of the wider south – eastern Europe and Balkans, emphasizing on the leading role of the ASE in this region (V. Margaris, 2000), where there are countries that have recently entered – or they wish to enter – EU. At the end of this paragraph, we will discuss the consequences resulting

from the unification of European stock markets on the ASE.

### **2.2. The forms of Collaborations among the Athens stock exchange and the other European stock exchanges**

Nowadays, the Greek market is discussing prospects of cooperation with the stock exchanges of the EU. First of all, ASE has made attempts to enable international financial institutions to have direct access. For this purpose, the economists have decided the creation of an international telecommunications network that will interconnect the Completed Automated Electronic Transaction System (OASIS) platform with the Milan, London, Frankfurt and Paris stock markets. However, the proper function of this network demands many institutional changes, among which the enactment of stock lending, a market maker institution with sufficient financial resources to assure market price stability, and so on (Vasilis Georgas, 2000).

Besides, the management of the Athens Stock Exchange is in contacts with a lot of European stock markets. Particularly, the Athens Stock Exchange held discussions with the Milan and Sweden (OM) stock exchanges for the establishment of a Central Counter Contracting Party.

The Athens stock market has also come in contact with Euronext, the latest grand alliance between the Paris, Amsterdam, Brussels and Lisbon stock exchanges. Euronext recently announced its new strategy, by promoting, apart from the mergers, technological cooperation and cross membership. The cross membership enables the members of one of the four stock exchanges to have direct access to give orders to the other three stock markets.

At the same time, the Athens Stock Exchange is advancing its networking with markets of the European Union. Within this frame, the Athens Stock Exchange cooperates with the Madrid Stock Exchange and the company GL Trade regarding the adoption of the relevant Visual Trade system. Visual Trade system is an electronic system which interconnects members from various markets.

Moreover, the intensification of co-operations between the Athens and London Stock Exchanges as well as between the Athens Stock Exchange and the other big European stock markets has been the subject of discussions among the two countries. These contacts are considered to be very important.

The main purpose of the London Stock Exchange is to help the Athens Stock Exchange to create a stock index for blue chips which will be common for the stock exchanges of the Balkans countries.

In addition, the management of the Euronext-NYSE platform, which is an alliance between the capital markets of Euronext and New York, has proposed the ASE to participate. At the same time, the ASE has been invited to undertake the management of the stock exchanges of the south – Eastern Europe. This proposal is in agreement with the Athens Stock Exchange strategy for development.

Moreover, the Electronic Secondary Securities Market (HDAT), which is the Bank of Greece trading platform for government debt securities in the secondary market, has recently been connected to the European MTS system. This connection enables non-resident financial institutions to participate in HDAT. Their treasurers from their screens in London can trade Greek bonds through HDAT. MTS system also enables HDAT's participants to trade directly in other European markets. Besides, the need for a single monetary policy in Europe caused the creation of an autonomous sub system through which the auctions of ECB are automated.

All these plans for co-operations are yet very ambitious and extra time is needed for their accomplishment. In order the alliances of the stock exchanges to work out properly, the progressive adaptation of the information technology is needed, as long as the adaptation of accounting standards, the creation of new indexes and new investment products (Vasilis Georgas, 2000).

### **2.3. The Collaborations among the Athens stock exchange and the stock exchanges of the countries of the wider region of Balkan and south-eastern Europe**

The ASE has been invited to take an administrative role for the cooperation of the south – Eastern Europe stock exchanges, as it is the only developed market in this region. Moreover, the Greek stock market plans to create a stock exchange platform where selected enterprises of the Balkan and south-eastern Europe countries will be listed. The creation of this platform will move many developing companies of the regional economies to the ASE.

The Athens stock market has established a work group with the stock exchange of Istanbul regarding the link of the two markets. This link will enable the

investors of the two countries to be able to watch the two markets in real time and to sell and buy stocks. For this purpose, they examined technical interconnections issues, the clearing and settlement methods and the listing and disclosure requirements. The work group will try to define the form of interconnection. Next, they will begin the materialisation. We have to notice that the two stock markets are the most profitable ones in the south-eastern Europe and they have the highest transaction volumes.

The Athens stock market is promoting partnerships with the neighbouring Sofia, Bucharest and Lubliana stock markets. Besides, the establishment of a regional Stock market index is being discussed with the stock exchanges of Tel Aviv and Cyprus.

Moreover, the Athens and Belgrade Stock Exchanges started their contacts at the end of the year 2000. Two years later they came in an agreement. Particularly, the agreement is incorporated in the memorandum of cooperation, which was signed by the Governments of the two countries. Their cooperation aims to the drawing up of a project plan for the development of the Serbian Capital Market.

In the frame of this project, the two countries decided the installation of the Completed Automated Electronic Transaction System (OASIS) trading platform and other peripheral support systems at the Belgrade Stock Exchange (BSE). At the same time, the ASE will provide the BSE with advisory services regarding the elaboration of a statutory and regulator framework for the operation of the capital market in Serbia. The aim is to create to the Belgrade market a modern environment for clearing and settlement. Finally, the objective of the Athens Stock Exchange is the further extension of the cooperation with the BSE with the participation of other countries of this region. However, the final objective is the integration consolidation of the Balkan markets.

The whole project will be accomplished by the Athens Stock Exchange and the ASYK SA (System Development and Support House of the Capital Market SA), which is a member of the Hellenic Exchanges Holding SA. ASYK was founded to support and modernize the Greek capital market, by introducing innovative proposals and solutions, on information technology and financial issues.

However, every one of these markets has difficulties and certain features. So, the efforts of the ASE should be continuous and long-lasting. For this purpose, the ASE promotes the activation of the

Emerging Capitals in Greece, but the financial sector has not satisfyingly corresponded to it.

#### **2.4. The Consequences of the unification of the European stock markets for the Athens Stock Exchange**

The discussions between the European countries have already led to important agreements and co-operations. The integration of the Greek stock market at the merger of European stock markets will soon be feasible. This merger will create a powerful Stock Exchange market in Europe, which would be comparable to the one of the United States.

The unification of the stock markets will strengthen the Athens Stock Exchange. Greek blue chips will be included in the indexes of the single under configuration platform. In addition, this process is expected to generate new investment products, which will also raise the investment interest.

Moreover, the proposal for collaboration among the Athens Stock Exchange and the Euronext is a very positive advancement, which will strengthen the developmental plans of the Greek Stock market. This alliance will allow the better service of the companies capital needs as it will raise the transaction volumes and it will provide several alternatives for the covering of capital investments. At the same time, Greek investors will have more alternatives to reduce the transaction risks and the transaction costs and they will also be provided with direct access to other stock markets (Leonidas Stergiu, 2000).

The establishment of a Central Counter Contracting Party with the Milan and Sweden (OM) stock markets will have important positive consequences. The Central Counter Contracting Party will secure the smooth and unhindered operation of the market in periods of unwelcome developments, such as the inability of a member to satisfy, in part or in total, its obligations, with a simultaneous reduction of cost that this securing means through:

- The calculation of the risk that results from the execution of the transactions to their final and irrevocable settlement and the obtaining of the necessary guarantees from the counter contracting parties and
  - The minimization of the systemic risk that may cause severe chain side effects to the market.
- The benefits that may result from the application of the Central Counter Contracting Party and will be expressed as reduction of the cost of trading are:

- The release of capital from the Guarantee Fund, which currently covers both the relation member - investor and the risk of the counter contracting party.
- The reduction of the necessary guarantees by the members of the Athens Stock Exchange.
- The more efficient use of capital that have been blocked by the supplementary Fund.

The success of this venture aims at making the participating markets more competitive as regards cost / security in relation to the other stock markets. Simultaneously, the minimization of human intervention straight through processing will be pursued, so that the mistakes and the time required between the transaction and settlement are reduced.

Moreover, there are a lot of developing economies in the wider region of Balkans. Many countries of this region are future members of the European Union and others have just entered the EU. The prospects of those countries certainly concern the developed capital markets. This fact means that the leading role of our stock exchange for the management of the stock markets of the wider region of Balkans will obviously intense the importance of its role in the EU. In addition, our country will have the possibility to become stock exchange centre of this region.

Besides, the agreement between the Belgrade and Athens stock exchanges for the development of the Serbian market, which end up in a very close cooperation or even homogenization of the markets of Greece and Serbia, is beneficial for both of them. First of all, this alliance has resulted in greater liquidity and in providing more financing possibilities. The benefits for the Athens stock exchange concern not only the listed companies, but also this agreement provides the agencies of the Greek market, such as securities companies and underwriters, with the possibility to expand their activities in Serbia. At the same time, this collaboration is in agreement with the Athens Stock Exchange strategy for co-operations and development.

We have to notice that as long as the unification of the European Union stock exchanges delays, the NASDAQ came in contacts with several European money-markets. This fact has actuated the management of the most important European stock exchanges, among which the management of the London and Frankfurt stock exchanges, to express their interest in establishing stock exchanges branches in Athens and Thessalonica. The economists believe

that those branches will provide Greek investors with direct access to foreigner stock exchanges.

### **3. The way towards the complete unification of the European stock exchanges**

#### **3.1. Introductory comments**

Until recently, the absence of a European market for growth companies had led many of them to make an appeal to the U.S. electronic stock exchange, the National Association of Securities Dealers Automated Quotations (NASDAQ). However, during the last years, the European stock markets have entered into a period of important structural changes. Many mergers, alliances and co-operations have been completed and ambitious plans have been announced for the creation of a European market for high-developed companies

Moreover, the present completion of European money-markets, which resulted from the launch of Euro, the development of initiatives associated with the co-operations and alliances between European stock markets, the emergence of big financial groups and the large number of cross-border mergers that have took place are the main reasons which made the integration of the single market for financial services absolutely necessary.

At this paragraph, we will discuss the factors that will lead to the complete unification of the European markets and the conclusions of the special Lisbon European Council (March 2000). We will also study the necessary steps, which should furthermore take place, for the unification of European capital markets. Precisely, we will refer to the harmonisation of operational rules and we will notice how much important is to chose suitable information systems for the support of transactions. Finally, we will refer to the great advancements in information systems and to the Electronic Communication Networks (ECNs), which could constitute the core of the single electronic European stock market.

#### **3.2. The Factors which will lead to the complete unification**

Though European stock prices have soared in the last year, the markets remain fragmented and inefficient. Each European country has at least one exchange, and few companies are traded in more than one market. Trading volumes tend to be lower, because activity is scattered among multiple exchanges that run on different rules, different languages and different technologies (Edmund Andreas, 1998).

We have to notice that the creation of EURONEXT, EASDAQ (the pan-European stock exchange in Brussels for high-growth companies which was modelled on NASDAQ) and EURO.NM (the European network of markets, which was formed as an alliance between the fledgling markets of Amsterdam, Brussels, Frankfurt and Paris) gave enough potential for growth companies in Europe. The competition between growth companies can have a sound influence on the investors. Besides, these three European markets offer to companies which are established outside the European Union new opportunities in raising capital.

Fortunately, there are positive signs of change in the unification of the European markets. First of all, the launch of the EURO on 1st January 1999 hastened the move to cross-border alliances. In addition it facilitated – and will greatly facilitate in future – the emergence of more pan-European financial instruments towards more harmonized conditions in financial markets. According to the European Union regulation, the transactions of all listed companies are made under the single currency. This fact facilitates the further steps for the unification of the European markets. If you have a single European currency, then a single European stock market is a natural consequence (Kerin Hope, Benjamin Jones, Bruce Barnard and Alan Osborn, 1998).

Besides, the removal of exchange risks between participating countries will significantly enhance the size and liquidity of the European financial market place. The obsolescence of currency matching requirements between assets and liabilities, which leave a limited capacity to invest abroad, is no longer necessary in the Euro zone. This fact creates more freedom for institutional investors (Commission of the European Union Communities, 1998).

Moreover, in the next few years, Europe will be brimming with cash for equity investments, as mutual funds seek to plug the gap left by governments scaling down or withdrawing from the provision of state pensions. In addition insurance funds are now growing steadily in Europe. Provided reasonable prudential rules are agreed for the deployment of these funds, then a deeper pool of capital will be available for risk capital investments in the future.

Finally, some European stock exchanges have already begun to co-operate in the fields of harmonised transaction systems, identical settlement procedures, standardised software and a family of joint indexes. All these fields represent the pan-European

equity market and could help reduce fragmentation in the European stock market.

### **3.3. The conclusions of the special Lisbon European Council as regards to the further steps for the stock markets unification**

The unification of the European financial sector was the main issue of the special Lisbon European Council in March 2000. The European Heads of State or Government attempted to harmonise the operational rules of the European stock markets. So, they adopted the Financial Service Action Plan containing a set of political objectives and specific measures aimed at creating an adequate framework for a single European financial services market. Essentially action was envisaged under three strategic objectives: a single EU wholesale market, an open and secure retail market and “state of the art” prudential rules and supervision.

In October 1998, the Commission published a Communication setting out a Framework for Action on Financial Services, followed by the **Financial Services Action Plan** (FSAP) itself in May 1999. At the European Council in Lisbon, the 15 European Heads of State or Government called for full implementation of the FSAP by 2005 (The committee of wise men, 2000).

A Committee of Wise Men, chaired by Baron Alexandre Lamfalussy, on the Regulation of European Securities Markets was set up by the Council (Ecofin) in July 2000. The committee identified a number of priority areas of the Financial Services Action Plan to be adopted and brought into effect by the end of 2003 at the latest, including (Richard Thompson, 2001):

- a single prospectus for issuers;
- the modernization of admission to listing;
- home country control for wholesale markets with a clear definition of professional investor;
- modernization and expansion of investment rules for UCITS and pension funds;
- the adoption of International Accounting Standards; and
- a single passport for recognized stock markets.

The Committee of Wise Men suggested in its final report in February 2001 a four-level regulatory approach with the creation of two committees: the European Securities Committee (ESC), which would comprise state representatives and the European Securities Regulators Committee (CESR), which would be based on the Forum of European

Securities Commissions (Gérard Hertig, Ruben Lee, 2003). The European Commission would consult with the ESC and then request advice from the CESR. The ESC would then vote on the final proposal and, if approved, the European Commission would adopt the proposal.

Under Level 1, the Committee proposed the framework for new legislation, which would be established by the EU Council and Parliament, in conjunction with the European Commission. In Level 2, the implementing details of the new legislation would be decided. The European Parliament would have the opportunity to examine the final proposal and, if it considered it exceeded the implementing powers defined in Level 1, the European Commission would re-examine the proposal. The CESR would, in Level 3, be involved in improving the consistency and uniformity of implementation of the new legislation at a national level. In Level 4, the committee advocates that the European Commission must enforce EU law more rigorously.

In October 2003 the Commission launched the first step of the FSAP review process with the constitution of four expert groups to prepare reports on the state of financial integration following the FSAP in the banking, insurance, securities and asset management sectors. These reports have now been finalised and were published in May 2004 as the basis for comment by all interested parties. They reflect the consensus view of the group members and were discussed during the Egmont conference organised by the Commission in June 2004. A synthesis of the responses should be published and the Commission services will submit their assessment on these issues for consideration by the new College of Commissioners early in its mandate (Europa, 2004).

### **3.4. The necessary further steps for the unification**

National differences in technical and legal infrastructure and market practices have been at the root of market segmentation and are the main impediments to fuller integration of the European stock markets (Helmut Schieber, 1999). The mergers, alliances and collaborations that have been achieved up until now between the various European capital markets are important. However, a lot of work is still necessary, so that new members will be able to enter in and in order to strengthen the existing alliances.

However, we have to notice that during the autumn of 1998 the International Organisation of Se-

curities Commissions (IOSCO) have made some notable progress towards international harmonisation of securities by adopting 30 principles of securities regulation and supervision. Its objective is the completion of these principles and the addition of new ones, which will facilitate even more the stock markets unification.

As regards to the alliance of EURONEXT, we could say that it is the world's first cross-border exchange organization. EURONEXT could be the core of the pan – European stock market. Its operation is based on rules, which could vary depending on the shareholder residence or on the country of origin of the listed company. Moreover, the information systems, which support EURONEXT, are not the same for all the stock markets of the alliance. Certain platforms are used by just one or two of the stock markets and they are expected to be adopted by the rest.

Besides, the “strategic alliance” between the London Stock Exchange and its German counterpart for the creation of a unified stock market has broken down. The alliance had always been subject to the competing interests of its two members. However, the main reason of this failure was the differences in regulation and information systems. The merged exchange, to be known as international exchange (“iX”), could have been the most significant accelerative factor for the creation of a pan- European stock market.

Consequently, both the operational rules of the European stock markets and the information systems have to be harmonised in order to accomplish the whole unification of the four stock markets of the EURONEXT alliance. This alliance could be the precursor of the pan–European stock market, and could lead to the complete unification of the European stock markets.

### **3.5. The harmonisation of the stock markets operational rules**

#### *3.5.1. General comments*

At the initiative of the French presidency, the ECOFIN meeting of 17 July 2000 decided to advance in the adaptation of the European regulations on the value markets. The European governments concluded that they should therefore harmonise the operational rules of their stock markets, as a part of the measures that comes after the launch of EURO (Kostas Moshonas, 2000).

Moreover, one of the subjects that was discussed during the ECOFIN council was the march of events in EUROPE towards the unification of the European markets. These events, to be known as “X cases”, concern among others the unsuccessful effort of the London and Frankfurt stock exchanges to merge and the alliances of Euronext, EURO-NM and EASDAQ. Based on them, we could draw our conclusions on the necessary harmonisation of the stock markets operational rules.

Next, we will discuss the harmonisation of the tax regulations. We will also refer to the necessary harmonisation of all other processes, which prevents the unification of the European stock markets.

#### *3.5.2. The harmonisation of the tax regulations*

First of all, we have to refer to the withholding tax that is applied by the authorities on the gross dividend amount. The governments should decide to enforce a regular and common withholding tax, regardless of the shareholder's origin country and also regardless of the location of the enterprise whose stocks are possessed by the certain shareholder.

Besides, great attention should be paid to the definition of the dividend. Precisely, concerning to the liquidation dividends which are paid to the shareholders after the liquidation and the complete dissolution of an enterprise, it should be clarified if they are dividends and if they are taxable or not. Similarly, it should be made clear if the amount that is paid by the enterprise to the shareholders is a dividend in order to be taxable as well or not.

Moreover, the governments should decide whether the dividend withholding tax that has been paid by the shareholders may be claimed against the income tax due. In any case, the management of the stock markets should also set rules for the social security charges that dividends are subjected to. These rules should as well refer to the range of the percentages of these charges to the dividends.

Furthermore, the governments should also define the rules on which the distribution of the profits, which will result from the common Stock Exchange transactions, will be appointed.

Finally, as regards to the capital gains, once again a decision is needed on the annual amount of securities sold, above which capital gains will be taxable. While, the case of capital losses also needs to be taken into consideration.

3.5.3. *The harmonisation of the other processes*

The transparency should be increased in the European Markets to enable their unification. The creation of a regulating frame is the next thing, which should be taken into consideration. This frame should also include the settlement at a pan-European base, something that is still not even a thought.

Clearing and settlement process is the most essential part of securities trading (Felix Amit Abraham, Barath Narayanan, 2006). So, the choice of the most suitable clearing and settlement model is the most important problem for the unification of the European stock markets. In general when we talk about **clearing and settlement** process, it refers to an organized system or arrangement for the clearing and settlement of payment obligations and transfer of securities among the two parties who have performed the trade (X. Gortsos, E. Gkatzonas, X. Livada, Dr X. Mertzanis, V. Papaikonomu, M. Basil, P. Papagianidu, 2002).

At the following figure (FIGURE 1), we can see the most dominant settlement models. The first model, which is also the most likely to be used, plans to maintain the national stock markets. Each national stock market will have its own settlement system. The stock markets will be interconnected, in order to appear as a single stock market with one transaction system and common stock brokers. The second model reckons on the connection between all the stock markets and their settlement systems using a common settlement system.

We have to notice that the London stock exchange supports the first settlement model, while the clearing house for the London Stock Exchange (the Crest) supports the second model. In addition, the first model using a common settlement system has also been applied at the NASDAQ (Leonidas Stergiu, 1999).

Moreover, there are different ways to trade stocks and the choice of trading system is also critical, as different systems are more suitable depending on the size and urgency of a transaction. In general, stock markets tend to be either **'order-driven'** or **'quote-driven'**. The difference between these two market systems lies in what is displayed in the market in terms of orders and bid and ask prices.

In order-driven markets, participants are permitted to submit priced orders into the system, which are then matched with other orders on the other side of the market. If there is no other side, the order will remain open. Access to the system is generally granted to those that can establish sufficient financial resources to support their offers. The brokers act as agents to post investor orders to a computerized central limit order book where they are executed automatically in price, and then time, priority.

The quote-driven markets focus on the bids and ask of market-makers. These market-makers must also establish a certain level of financial resource. Participants who do not wish to provide two-sided quotes (an offer to buy and an offer to sell) cannot access the quote-driven market directly, but must

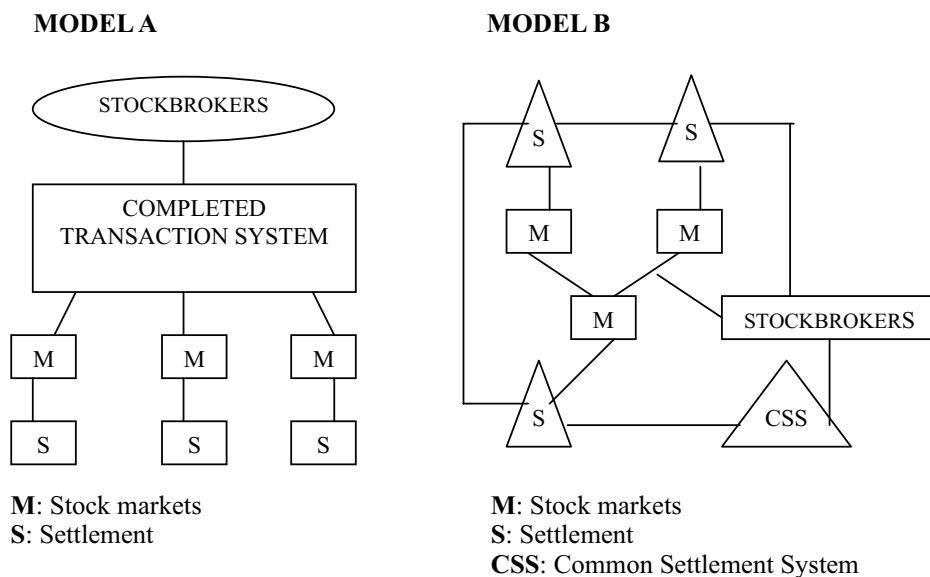


FIGURE 1 The two most dominant settlement models.

place their orders through a market-maker (Andrew Beeson).

SEAQ (Stock Exchange Automated Quotations system), which was the London stock exchange old platform, is a quote driven system. On October 27, 1997 the London Stock Exchange replaced the Seaq system with the Sets (Stock Exchange Electronic Trading), which is an order-driven system. The linkage of the transaction systems of two order-driven stock exchanges is a much easier process, than the linkage of two quote-driven ones. The linkage becomes even easier in case the two stock exchanges are in the same time zone and the order-driven system one with global price and time priority.

Another decelerating factor for the unification of the European stock markets is the fact that the German, French and English systems use a different meaning for equities as a legal term. However, in order the companies to be able to float simultaneously on all the European stock markets, they must first decide on which of those meaning will be used.

The European stock markets should synchronise their trading hours as part of creating a single Euro-stock market. It is not possible for us to speak for a pan-European stock market, which will operate at different hours for each country - member.

The listed companies at all the members of the single stock market should be the same. The solution to this problem is the decision that at least for the beginning the listed companies will be all the blue chips.

In addition, there is also a need for common stockbrokers at the new stock market. This problem has been solved at the moment by the decision that any stockbroker who wants, he can participate at the new stock market.

One other problem that should be solved at a European level for the unification of the European stock markets is the type of management of the European companies (which is now different between the countries – members). Particularly, the issues that must taken into consideration is the company's regulation, the workers participation in management and mainly the provision of common motives for all of them (Giorgos Kuvaras, 2000).

Moreover, the rules which are related to floating on a stock market, to the maintenance and publication of balance-sheets, to the bankruptcies, to the mergers and acquisitions, to the banks' and insurance companies' capital adequacy and to all the oth-

er operational rules of the stock markets should also be harmonised for the unification of the European stock markets. Particularly, as regards to floating, it should take place simultaneously on all the European stock markets (Giorgos Karelias, 2000).

We have to note that the European Union has already taken certain decisions, according to which all the listed enterprises of the European stock markets, as well as the European enterprises that are preparing to float on a European stock market, are compelled to prepare their consolidated statements using the International Accounting Standards.

Certain measures should also be taken for the selection of a common pensions reserves investment management. The role of the banks is necessary at this section. The banks are members of the markets, but they are also the representatives of both the companies and the investors. They have the role to help for the growth of the markets.

The world money-markets need a powerful European base. The markets of U.S.A. and Japan will not manage to make it alone. The stocks can play another role even more important than the one they practice now. We should note that there is no growth without the stocks, and of course no stocks exist without growth (George Ugeux, Vice President of the NYSE).

### **3.6. The necessary Information Systems which will support the common stock market**

#### *3.6.1. General comments*

One other important issue is the interconnection techniques. The stock exchange platform is an issue as much important as the legal framework that it is chosen by the stock markets that decide to merge. The unification process will not incorporate without any connections or changes to the existing information systems. It is very difficult to chose the transaction platform and the information system which will be used for settlement and clearing.

Moreover, in case of an alliance, the choice of one of the existing platforms may not be a good decision. No matter how good this platform is and even if it corresponds ideally to the new needs of the alliance, it is not sure that it will be accepted. The stock markets, which will have to reject their old platforms in order to use the common one, may claim that the stock market whose platform will be the common will gain a competitive advantage against them.

The Deutsche Börse's trading platform, the Xetra, is a representative example. While the London and Frankfurt Stock Exchanges proposed the Xetra to be the trading platform of the pan – European stock market, the Amsterdam, Brussels, Madrid, Milan, Paris and Zurich stock markets rejected this proposal, claiming that it would force them to change their information systems and would give Frankfurt a competitive advantage.

At the rest of this paragraph, we will discuss the harmonisation of the information systems that is needed for the unification of the European stock markets. We will also refer to the great improvements in information technology, which will be an accelerative factor for the unification of the European stock markets.

### *3.6.2. The harmonisation of the information systems*

First of all, a decision should be taken on the information system that it will be used as the trading platform of the single European stock market. The magnitude and cost of the change should not be underestimated. The management of the stock markets will probably not be willing to change their existing information systems, due to the fact that trading platforms demand high developing costs. Besides, the development of a new trading platform is quite time-consuming.

However, if the management of the capital markets really want to see the unification, they should not try to persuade other members about the advantages of their stock markets. Instead the management of the European stock markets should be ready to replace their existing trading platforms, because the stock markets can achieve their interconnection only if they use a common information system.

It is important the European stock markets to select the most suitable information system. The only criterion should be the needs of the unified market and not the directors' interests in gaining control or the expected cost for the development of the necessary software. The trading platform should have an open architecture, in order to allow multiple service providers to communicate and share data electronically. Based on the same standards, European stock markets should select their common derivatives trading platform.

The decision of the liquidation system is as much important as the trading platform. This plat-

form should be good in simultaneously liquidation of stock and derivatives in real time. Such an information system will considerably reduce the number of the required transactions. The reduction of transactions will result in huge savings for both local and distant users.

We have to notice that a suitable system should be chosen to enable faster and more reliable clearing and settlement transactions. Finally, information systems are also necessary to be selected for the settlement of a cross-border trade and for the handling of transactions in the commodities exchanges. These systems should be selected to best serve the reasons they have been developed.

### *3.6.3. The great improvements in information technology*

The recently technology advancements have allowed huge volumes of data to circumnavigate the globe in real time at near-zero cost. This advantage enabled Eurex, the Frankfurt-based electronic futures exchange, to poach the vital future on the 10-year German government bond from floor-based Liffe, even though most of the demand was coming from London and US screens (Edward Luce, 2000).

Moreover, it has been realised that all the same, the NYSE is adapting to new technologies. It has required its traders to use handheld electronic devices instead of paper, because they believe that two human beings with handheld devices will do a better deal than just two computers (Georges Ugeux, 2001).

Besides, the traditional stock exchanges in both Europe and the United States, while trying to overcome their differences and to find ways of co-operations, came down to a growing pressure from electronic communication networks (ECNs). ECNs are electronic trading systems that automatically match buy and sell orders at specified prices. As people have become more comfortable with technology, in general, and the Internet specifically, the use of ECNs will be increased.

ECNs provide the possibility of anonymous transactions. The only necessary data are a deposit account, in order to debit and credit it in a case of buying or selling stocks correspondingly, and a finance account for the handling of the stocks. Less time is needed for the implementation of the transactions at an ECN than at a traditional stock market. Another important advantage of ECNs is the great

facility they offer. ECNs allow the negotiations to be held 24 hours a day and 365 days a year. All the traditional stock markets have a standard operation schedule and they are closed at certain days of the year. However, as long as the Internet is available 24 hours a day, ECNs are continually available.

These advantages have made ECNs competitors of stock exchanges (Laura Unger, 2000). ECNs managed to gain a great part of the demand of the cross-border transactions and gain an even bigger "piece" of the world Stock Exchange pie. However, many economists insist that ECNs pose no threat to the traditional stock exchanges. They believe that investors will not be willing to stop using paper for their stock transactions (Bruce Stanley, 2001).

Nowadays, there are nine electronic communications networks (ECNs) that handle stock trades outside the traditional stock market and they account for one-fourth of all trades in Nasdaq stocks. Instinet, which is owned by Reuters Holdings, is the largest ECN, handling two-thirds of all electronic off-market trades. Institutional investors have had access to online trading with Instinet since 1969 but until recently individual investors have been left out. Other major ECNs include Island, owned by Datek, which handled orders worth more than \$187 billion during the third quarter of 1998; Tradebook, owned by Bloomberg; and Archipeligo. In January, 1999 executives at Goldman Sachs and E\*Trade signaled their belief in the future of ECNs when they purchased a 25% stake in Archipelago (Matthew Moshen, Susanne Mei, 1999).

It is fair to say that the European markets instead of trying to overcome their differences in regulation and information platforms, they should inform their investors about the ECNs, trying to persuade them to use these networks. In addition, European markets could seek their unification via the creation of an electronic European stock market.

#### **4. Conclusion and Suggestions for further research**

The unification of the European Stock Exchanges is still in its early stages. Despite the European Monetary Union and the obligation to adopt the International Accounting Standards, the pan-European stock market is extremely difficult to be created in the near future. Besides, the economic unification has not completely been achieved, as three mem-

bers of the European Union - Denmark, Sweden, and the UK - have decided not to ditch their own currencies and to stay out of the Eurozone. Moreover, important differences still exist in the tax regulation and trading platforms of the European Stock Exchanges.

The progresses of the technology and the information advent as well as the Internet and the competition from U.S. markets pressurize European stock exchanges to merge. Besides, big investment banks and financial organisations control the main volume of stock transactions. In addition they continuously need to raise capital and they search for new ways to differentiate their investments. They demand the transaction cost reduction, the yields and liquidity increase. Within this framework, they make cross-border transactions and they forge the European stock markets to merge.

Besides, the pan - European stock exchange will be a very important factor for the world economy and investments. The complete unification of the European stock exchanges should begin from the strengthening of the existing alliances between the European stock markets, with the participation of new members. The leading role of Athens stock exchange for the management of the stock markets of the wider region of Balkans is a significant factor. Its co-operations and alliances with the European stock markets will intense the importance of its role in the EU.

While struggling to overcome their differences, stock exchanges in Europe are coming under growing pressure from electronic communication networks. In order to compete ECNs, European stock markets will need to merge. Moreover, the further development of the electronic communication networks could lead to a single European electronic stock market. Such a stock market will not be located in a certain country. The Internet will be the "host country". The tax regulation of the stock markets, which will be the members of the single European electronic stock market, needs harmonisation. However, there is no need for harmonisation of the information systems, because a completely new platform will support the single European electronic stock market. The development of the single European electronic stock market will be the subject of our next paper.

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# Inefficient Markets and Technical Analysis: An Empirical Study

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**Abstract** – Although, there is an ongoing belief in the investment community that technical analysis can be used to infer the direction of future prices, the academic community has always treated it with skepticism. However, if there is a degree of effectiveness in technical analysis, that necessarily lays in direct contrast with the efficient market hypothesis. In this paper, we use neural network estimators to infer from technical indicators how to extrapolate future price movements. To the extent that the total return of a technical trading strategy can be regarded as a measure of predictability, technical analysis can be seen as a test of the independent increments version of random walk. Our findings are striking. Incorporating trading costs, a simple trading strategy based on the 5-day return forecasts of a neural network consistently and significantly outperformed the buy-and-hold strategy. Moreover, buy signals consistently generated higher returns than sell signals and the returns following sell signals were negative, which is not easily explained by any of the currently existing equilibrium models. Our results indicate that there is predictive power in the technical indicators, a finding that can be regarded as evidence against return randomness.

## 1. Introduction

The efficient market hypothesis (EMH) states that the current market price reflects the assimilation of all the information available. This means that given the information, no prediction of the future price changes can be made. As new information enters the market, the unbalanced state is immediately discovered and quickly eliminated by a “correct” change in the market price. In Fama (1970), the concept of efficient markets was for the first time formalized, even though the mathematical foundation had been put forth earlier in Mandelbrot (1966). Fama expresses the non-predictable characteristic of market prices formally as:

$$E\left[\tilde{r}_{jt} - E_m\left[\tilde{r}_{jt} \mid \Phi_{t-1}^m\right] \mid \Phi_{t-1}\right] = 0$$
$$E\left[\tilde{u}_{jt} \mid \Phi_{t-1}\right] = 0$$

where

$\Phi_{t-1}$  is the complete information set at time  $t-1$ ,  
 $\tilde{r}_{jt}$  is the return of security  $j$  at time  $t$ ,

$E_m\left[\tilde{r}_{jt} \mid \Phi_{t-1}^m\right]$  is the expectations of  $\tilde{r}_{jt}$ , assessed by the market on the basis of information set  $\Phi_{t-1}^m$ .

Fama then goes on to state explicitly that this rules out any possibility of trading strategies based

1. The tildes indicate random variables.
2. Let  $\Phi_t$  and  $F_t$  be information sets, such that  $F_t \subset \Phi_t$  so all the information in  $F_t$  is also in  $\Phi_t$ , but  $\Phi_t$  is superior because it contains some extra information. Also let  $E[X \mid F_t]$  and  $E[X \mid \Phi_t]$  be the expectations of a random variable  $X$  conditional on those information sets. *The Law of Iterated Expectations* states that  $E[X \mid F_t] = E[E[X \mid \Phi_t] \mid F_t]$ . That is, if one has limited information  $F_t$ , the best forecast one can make of a random variable  $X$  is the forecast one would make of  $X$  if one had superior information  $\Phi_t$ . This can be rewritten as  $E[X - E[X \mid \Phi_t] \mid F_t] = 0$ , which has an intuitive interpretation: One cannot use limited information  $F_t$  to predict the forecast error one would make if one had superior information  $\Phi_t$ .

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solely on information in set  $\Phi_t$  that have expected profits or returns in excess of equilibrium expected profits or returns. According to Fama, the EMH has three different forms, based on how large the information set  $\Phi_t$  is; the strong form, the semi-strong form and the weak form.

- Weak-form efficiency: the information set  $\Phi_t$  includes only the history of prices or returns themselves.
- Semistrong-form efficiency: the information set  $\Phi_t$  includes all information known to all market participants (public available information).
- Strong-form efficiency: the information set  $\Phi_t$  includes all information known to any market participant.

In order to test whether a particular trading strategy based on an explicitly specified information set would earn superior profits, we must first choose an information set  $\Phi_p$ , that is we must choose one of the three aforementioned forms of market efficiency. Then we must assume an equilibrium model that defines normal returns. As a result, if that test is rejected, this could be because the market is truly inefficient or because the incorrect equilibrium model has been assumed. This is known as the *joint hypothesis problem*.

There is a long-dated and heated market-efficiency debate and there exists an array of statistical methods that can be used to test the joint hypothesis of market efficiency and market equilibrium, i.e., tests of variance bounds, Euler equations the CAPM and the APT. However, Campbell, Lo and MacKinlay (1997) (CLM) argue that those statistical methods can (and should) be more profitably applied to measuring efficiency rather than to testing it. The reason for this being, that if some markets turn out to be particularly inefficient, some investors could take advantage of the opportunity. As CLM put it “perfect efficiency is an unrealistic problem that is unlikely to hold in practice”.

Moreover there is a series of reported regularities that seem to challenge the EMH and thus they are referred to as “anomalies”. Barberis, Shleifer and Thaler (1998) (BST) categorize those pervasive regularities in two categories: underreaction and overreaction. Overreaction occurs when the average return (an approximation of expected return) following a series of announcements of good news is lower than the average return following a series of bad news announcements. Formally:

$$E\left[\tilde{r}_{t+1} \mid z_t = G, z_{t-1} = G, \dots, z_{t-j} = G\right] < \\ E\left[\tilde{r}_{t+1} \mid z_t = B, z_{t-1} = B, \dots, z_{t-j} = B\right]$$

where  $z_t$  is the news that the investor hears in period  $t$ ,  $G$  is good news,  $B$  bad news and  $\tilde{r}_{jt}$  is the period  $t$  return.

Underreaction on its turn occurs when the average return on the company’s stock in the period following an announcement of good news is higher than the average return in the period following bad news. Formally:

$$E\left[\tilde{r}_{t+1} \mid z_t = G\right] > E\left[\tilde{r}_{t+1} \mid z_t = B\right]$$

Daniel *et al*, (1998) provide an extensive classification of the most pervasive anomalies:

- event based return predictability (public-event-date average stock returns of the same sign as average subsequent long-run abnormal performance),
- short-term momentum (positive short-term autocorrelation of stock returns, for individual stocks and the market as a whole),
- long-term reversal (negative autocorrelation of short-term returns separated by long lags, or “overreaction”),
- high volatility of asset prices relative to fundamentals,
- short-run post-earnings announcement stock price “drift” in the direction indicated by the earnings surprise, but abnormal stock price performance in the opposite direction of long-term earnings changes.

DeBondt and Thaler (1985) performed an event-study focusing on the stocks that have experienced either extreme capital gains or extreme loses over periods up to five years. “Winner” and “Looser” portfolios were formed conditional upon past excess returns, rather than some firm-generated informational variable such as earnings. In their findings they report substantial weak-form market inefficiencies.

The theoretical debate around EMH is unlikely to settle any time soon. On the other hand, financial professionals routinely use technical analysis, seemingly oblivious to the EMH statement that the current market price reflects the assimilation of all

the information available, and as a consequence, given the information, no prediction of the future price changes can be made. In other words, since technical analysis is based on public information, it should not generate excess profits if markets are operating efficiently.

But what if technical analysis does generate excess profits? In that case technical analysis can be used as a kind of “economic” test of the random walk version of independent but not identically distributed increments. Thus, it is not surprising that contrary to the traditional dismissive attitude of the financial academics towards technical analysis, today there is a growing interest and a fast expanding empirical literature.

In this paper we use the nonparametric approach of neural networks in an attempt to reveal the existence of a more complicated return generating mechanism than those suggested from studies using linear models, and thus perform an “economic” test of the randomness in stock returns. The rest of the paper is organized as follows: In the next section we present a review the relevant literature on technical analysis. In section 3, we present our data and the related empirical statistics. In section 4, we give a general technical forecasting framework, we determine the relevant technical indicators for our analysis, we explain how a neural network can be used for predicting future returns based on technical indicators and we present two simple trading strategies based on the network’s forecasts. In section 5, we present our results and in section 6 we conclude.

## 2. Inefficient markets and technical analysis

Technical analysis is essentially the search for recurrent and predictable patterns in asset prices. On the other hand, fundamental analysis focuses on the determinants of the underlying value of the firm, such as current profitability and growth prospects. Because both types of analysis are based on public information, neither should generate excess profits if markets are operating efficiently. Of particular importance is technical analysis, firstly because of its widespread use and secondly because it can be used as a kind of “economic” test of Random Walk 2 (RW2) hypothesis, i.e., that the natural logarithm of prices  $p_t = \ln P_t$  follows a random walk with independent but not identically distributed (INID) increments, i.e.,

$$p_t = \mu + p_{t-1} + \varepsilon_t$$

where  $\mu$  is the expected price change or drift and  $\varepsilon_t$  is the random shock. RW2 allows for unconditional heteroskedasticity in the  $\varepsilon_t$ ’s, a particularly useful feature given the time-variation in volatility of many financial asset return series.

There is an ongoing belief in the investment community that technical analysis can be used to infer the direction of future prices. A substantial segment of the investments industry is dedicated to this form of analysis, with virtually all investment banks and trading firms employing some technical trading strategies. Taylor and Allen (1992) provide the first survey-based evidence about the use of technical analysis from London chief foreign exchange dealers. They report that 90 percent of those surveyed said they used technical analysis in making decisions. Most respondents reported using both fundamental and technical analysis, with a bias toward using technical analysis for shorter period horizons and fundamental analysis for longer horizons. Their core results have been confirmed for Germany from Menkhoff (1997), for Hong Kong from Lui and Mole (1998), for the USA from Cheung and Chinn (2001). Despite its popularity among practitioners, a lot of academics regard technical analysis with skepticism, since it is inconsistent with the theory of market efficiency. Much of the finance theory relies on the assumption of market efficiency because (in theory), in its absence, investors could earn excess profits while assuming little or no risk, a state that it should not be sustainable in equilibrium. But is this supported by the empirical findings?

Alexander (1961) is the first to report that a move in US stock prices “once initiated tends to persist” and thus technical trading in the form of “filter rules” can be profitable. According to a  $x\%$  filter an asset is purchased when its price increases by  $x\%$ , and (short)sold when its price drops by  $x\%$ . After Mandelbrot (1966) pointed out that Alexander’s computations incorporated biases that led to serious overstatement of the profitability of the filters, Alexander in his later paper (Alexander, 1966) reworked his earlier results to take account of the bias. In the corrected tests the profitability of the filter technique was drastically reduced. However, Fama and Blume (1966) when taken transaction costs into account reported that “if the costs of operating different ver-

sions of the filter rule are considered, it seems that even the floor trader cannot use it to increase his expected gains appreciably". Levy (1967*a, b, c*; 1968) reported empirical results of variations of a technical portfolio trading rule that he called the "relative strength" or "portfolio upgrading". The rule was based solely on the past price series of common stocks and according to Levy "significantly" outperform a simple buy-and-hold strategy. On the basis of this evidence Levy (1967*a*) concluded "the theory of random walks has been refuted". Jensen and Benington (1970) replicated two of Levy's trading rules taking into account trading costs and reported that "the trading rules did not on the average earn significantly more than the buy-and-hold policy".

Then Neftci and Policano (1984) quantified the "moving average" and "trend following" technical trading rules and concluded that technical analysis provides information beyond that already incorporated in the current price. Sweeny (1988) reexamined some of the results of Fama and Blume (1966), tested the statistical significance of the filter rule profits and reported that "For this sample of stocks, it appears that significant profits can be made by investors with low but feasible transactions costs".

Neftci (1991) was the first to devise formal algorithms to represent various forms of technical analysis and he showed that a few of those rules generate well-defined techniques for forecasting. Brock, Lakonishok, and LeBaron (1992) (BLL) found that 26 technical trading rules applied to the DJIA significantly outperformed a benchmark of hold cash. BLL stated "overall our results provide strong support for the technical strategies that we explored". Their findings, when taken at face value, indicate that the stock market is not efficient even in the weak form, or that risk premia display considerable variation even over very short periods of time (i.e., at the daily interval).

Bessembinder and Chan (1998) by taking into account nonsynchronous trading confirmed the basic BLL results and they documented that "the forecast power was not solely attributable to return measurement errors arising from nonsynchronous trading". However, they argued that this evidence can coexist with the notion of market efficiency, since the break-even trading costs were small compared to estimates of the actual trading costs.

Sullivan, Timmermann and White (1999) (STW)

extended and enriched BLL by applying a procedure that permits a test for datasnooping. STW argued that the findings of BLL are especially strong because every one of the trading rules they consider is capable of beating the benchmark. By utilizing White's Reality Check bootstrap methodology (White, 2000) extended and reassessed the results of BLL and they found that they appeared to be robust to data-snooping, and indeed there were trading rules that performed even better than the ones considered by BLL.

Ratner and Leal (1999) examined the potential profit of Variable Length Moving Average (VMA) trading rules in emerging equity markets. For three out of ten countries they reported that the VMA trading rules might be profitable after transaction costs are taken into account. However, they also reported that 82 out of 100 country-trading combinations correctly predicted the direction of changes in the return series. On the other hand, Allen and Karjalainen (1999) reported that when incorporating transaction costs and using genetic algorithms to learn technical trading rules for the S&P 500 the rules do not earned consistent excess returns over a simple buy-and-hold strategy.

Lo, Mamaysky and Wang (2000) (LMW) proposed a systematic and automatic approach to technical pattern recognition using nonparametric kernel regression. By comparing the unconditional empirical distribution of daily stock returns to the conditional distribution (conditioned on specific technical indicators such as head-and-shoulders or double bottoms) they found that several technical indicators do provide incremental information. Jegadeesh (2000) as STW before him, while discussing the findings of LMW, warns that data-snooping and survivorship biases can be severe when evaluating technical rules, which can lead researchers to falsely conclude that technical trading strategies can predict future price movements.

Ready (2002) examined the predictability of daily returns for the DJIA by comparing the technical trading rules developed by Allen and Karjalainen (1999) with the moving average rules studied by BLL and he argued that the apparent success of BLL (after transaction costs) was a spurious result of data snooping.

In the theoretical front, other researchers developed models of inefficient markets in which investors benefit from conditioning on historical infor-

mation. Treynor and Ferguson (1985) and Brown and Jennings (1989) examine settings in which privately informed investors use past prices to determine whether their information has been revealed to the market and to learn about the private signals of other traders, respectively. Similarly, Blume, Easley and O'Hara (1994) (BEO) demonstrate that volume provides information on information quality that cannot be deduced from the price statistic. BEO show that analysis of sequencing in volume and price (only really available to those trading on exchanges) can be informative and advantageous to traders. Other researchers examined the possibility that common biases in human judgment lead to market inefficiencies. For example, DeBondt and Thaler (1985) discovered substantial weak form market inefficiencies when they empirically investigate whether or not, in violation of Bayes' rule, most people tend to "overreact" to unexpected and dramatic news events, and whether such behavior affects stock prices. Along the same lines, BST present a parsimonious model of investor sentiment (of how investors form beliefs) based on psychological evidence which produces underreaction and overreaction for a wide range of parameter values and is consistent with the empirical findings.

Kavajecz and Odders-White (2004) examined the relation of technical analysis to liquidity provisions focusing on NYSE. Specifically they reported technical analysis support and resistance levels as well as moving average indicators were significantly related to the state of liquidity on the limit order book. If this is true then technical analysis provides a method for locating liquidity on the book and traders using this information can better estimate and reduce transaction costs and increase the probability of execution by placing limit orders strategically. Moreover, these results indicate that the state of liquidity as measured by the position of depth on the book, may be an important determinant of future prices.

A number of studies have examined the performance of technical trading rules using daily foreign exchange data. Neely, Weeler and Dittmar (1997) using a genetic programming approach reported strong evidence of economically significant out-of-sample excess returns. Chang and Osler (1999) identified the common technical head-and-shoulders pattern as profitable. Osler (2000) examined trend reversal signals. By looking at support and resistance levels published by six trading firms she

found evidence of significant power to predict intraday trend reversals. The general conclusion of the aforementioned studies is that the trading rules are able to earn significant excess returns net of transaction costs, and that this cannot be easily explained as compensation for bearing risk.

However, Neely and Weller (1999) using a genetic program and an optimized linear forecasting model reported that when realistic transaction costs and trading hours are taken into account, there is no evidence of excess returns to the trading rules derived with either methodology.

Finally, Osler (2003) documented clustering in currency stop-loss and take-profit orders, and used that clustering to provide an explanation for two familiar predictions from technical analysis: *i*) trends tend to reverse course at predictable support and resistance levels, and *ii*) trends tend to be unusually rapid after rates cross such levels.

### 3. Index data and empirical statistics

We considered two of the most widely used US market stock indices (DJIA and S&P 500), which are probably the most observed financial indicators in the world. For each index, from the available daily price data we generated 5-day nonoverlapping logarithmic returns covering the period from 1 March 1990 to 2 November 2005. The full sample for each index contained 3,955 price observations and it was split into a training sample comprising 2,739 price observations and a test sample comprising 1,216 price observations. Each training sample covered the period from 1 March 1990 to 29 December 2000. Each test sample covered the period from 2 January 2001 to 2 November 2005.

The sample statistics of the 5-day continuously compounded returns for DJIA and S&P 500 are presented in Table 1. The means of the 5-day returns for the two indices are 0.17 percent and 0.16 percent, or 8.84 percent, and 8.32 percent annualized, correspondingly. The means of the 5-day returns in the training samples are considerably higher, i.e., 0.26 percent and 0.25 percent, or 13.52 percent and 13 percent annualized. The means of the 5-day returns in the test samples are all negative, i.e., -0.01 percent and -0.03 percent, or -0.52 percent and -1.56 percent annualized. The standard deviations of DJIA and S&P 500 are identical for the full sample, i.e., 2.20 percent or 15.52 percent annualized. All distributions show signs of skewness and heavy tails.

**TABLE 1** Sample statistics for nonoverlapping 5-day returns of DJIA and S&P 500.

Panel A	DJIA			S&P 500		
	total	train	test	total	train	test
Mean	0.0017	0.0026	-0.0001	0.0016	0.0025	-0.0003
Std.	0.022	0.020	0.025	0.022	0.020	0.024
Skew.	-0.422 (0.039)	-0.358 (0.047)	-0.422 (0.070)	-0.313 (0.039)	-0.342 (0.047)	-0.197 (0.070)
Kurt.	3.505 (0.078)	1.967 (0.094)	4.617 (0.140)	2.687 (0.078)	2.090 (0.094)	2.956 (0.140)
Panel B						
$\rho(1)$	0.787*	0.791*	0.780*	0.780*	0.780*	0.779*
$\rho(2)$	0.573*	0.566*	0.578*	0.559*	0.550*	0.567*
$\rho(3)$	0.356*	0.342*	0.372*	0.330*	0.311*	0.353*
$\rho(4)$	0.146*	0.119*	0.180*	0.112*	0.081*	0.152*
$\rho(5)$	-0.067* (0.016)	-0.093* (0.019)	-0.034* (0.029)	-0.107* (0.016)	-0.148* (0.019)	-0.052* (0.029)
Panel C						
Correlation (DJIA, S&P 500):	0.93 <sup>(a)</sup> 0.92 <sup>(b)</sup> 0.96 <sup>(c)</sup>					

In Panel A, “Total” refers to the full sample, “train” and “test” to the nonoverlapping, consecutive training and test periods correspondingly. In Panel B,  $\rho(i)$  is the estimated autocorrelation at lag  $i$  for each series and figures in parentheses are standard errors for the autocorrelation,  $1 / \sqrt{N}$ . In Panel C, <sup>(a)</sup> refers to the full sample, <sup>(b)</sup> refers to the training sample and <sup>(c)</sup> refers to the test sample.

In Panel 1B, we can see that the estimated autocorrelations  $\rho(i)$  at lag  $i$  in all cases are significantly different from zero. This implies that we can reject the hypothesis of uncorrelated increments (5-day returns), i.e., the weakest and the most often tested version of random walk in the empirical literature, for both samples. The other two versions of the random walk hypothesis, i.e., identically and independently distributed increments and independent increments are special cases of this version.

In Panel 1C, the correlation between the 5-day returns of the indices is very high; over 0.9 for all samples.

#### 4. Forecasting returns using technical indicators

##### 4.1 A general technical forecasting framework

Let us denote as  $I_t$  the index close at day  $t$ . Then the realized  $h$ -day logarithmic return at the end of day  $t$  is:

$$r_t = \ln(I_t / I_{t-h})$$

Let us also denote as  $\mathbf{x}_t = (x_{1,t}, x_{2,t}, \dots, x_{m,t})$  a vector of  $m$  technical indicators evaluated at the end of day  $t$  given the index close  $I_t$ . Then a deterministic function  $\zeta(\cdot)$  of  $\mathbf{x}_t$  can be used to produce a forecast

of the  $h$ -day future (and yet unrealized) return, i.e.:

$$\hat{r}_{t+h} = \ln\left(\frac{\hat{I}_{t+h}}{I_t}\right) = \xi(\mathbf{x}_t | I_t)$$

which is based on the implicit assumption that the return generating mechanism can be described by the following formalization:

$$r_{t+h} = f(\mathbf{x}_t | I_t) + \varepsilon_{t+h}$$

where, the term  $\varepsilon$  denotes random disturbances. In this framework  $\zeta(\cdot)$  is an estimator of the unknown deterministic component  $f(\cdot)$ . Note that the hat over  $I_{t+h}$  indicates that an estimate of the index level at  $t+h$  can be extracted from the return forecast and not that we attempt to forecast index levels.

At the end of day  $t$ , given the forecast of the  $h$ -day future return,  $\hat{r}_{t+h}$ , a signal,  $S_t$ , is generated (Buy, Sell, Neutral) according to the following rule:

$$\begin{aligned} &\text{if } \hat{r}_{t+h} > c \text{ then } S_t = \text{Buy} \\ &\text{else if } \hat{r}_{t+h} < -c \text{ then } S_t = \text{Sell} \\ &\text{else if } 0 < \hat{r}_{t+h} < c \text{ or } -c < \hat{r}_{t+h} < 0 \end{aligned}$$

**TABLE 2** Resulting portfolio compositions based on the combination of Ct-h and St.

$C_{t-h}$	Index Portfolio (I. P.)		T-Bills	
	$A_t$	$C_t$	$A_t$	$C_t$
Buy	no action	$C_t = C_{t-h}$ (I. P.)	buy index portfolio	$C_t \neq C_{t-h}$ (P.)
Sell	liquidate index portfolio	$C_t \neq C_{t-h}$ (T-Bills)	no action	$C_t = C_{t-h}$ (T-Bills)
Neutral	no action	$C_t = C_{t-h}$ (I. P.)	no action	$C_t = C_{t-h}$ (T-Bills)

then  $S_t = Neutral$

where,  $c$  represents a threshold return corresponding to the breakeven transaction costs.

The composition of the invested portfolio at any point in time (denoted as  $C_t$ ) can be either the index portfolio<sup>3</sup> or cash equivalents (short-selling is not considered). Based on the composition of the portfolio at the end of day  $t - h$  (denoted as  $C_{t-h}$ ) and the signal at the end of day  $t$  (denoted as  $S_t$ ) one of three actions is being performed:

- create index portfolio,
- liquidate index portfolio,
- take no action.

In Table 2 we see the allowed actions (denoted as  $A_t$ ) and the resulting new portfolio compositions,  $C_t$ . In the context of the simple framework we have just described, we are faced now with two problems. First, we must define the vector of technical indicators,  $\mathbf{x}_t$ , and second we must define the deterministic function  $f(\mathbf{x}_t | I_t)$ . To simplify our analysis, we set the forecasting horizon fixed to  $h = 5$  days.

#### 4.2. Determining the relevant technical indicators

Since, there are literally hundreds of technical indicators that can be used in the context of the aforementioned framework, we are faced with the problem of selecting the more *relevant*. However, relevance can only be determined in the context of a model. In or-

der to select relevant technical indicators, we have used stepwise variable selection in the context of a multivariate linear regression model. The model parameters were estimated from the training samples. Then the statistical significant technical indicators at the 95% level were selected as the most relevant for the DJIA and S&P 500 indices. From a universe of 54 technical indicators (simple moving average, exponential moving average, projection oscillator, MACD, Qstick, TRIX, etc) 13 were found to be statistical significant for predicting the 5-day return of the DJIA, and 17 for the S&P 500. Only 4 technical indicators were found to be relevant to both indices.

Variable selection with stepwise linear regression (26 out of 54, initially) for forecasting the 5-day return. In the second column, 1 refers to DJIA and 2 to S&P 500.

#### 4.3. Estimating $f(\mathbf{x}_t | I_t)$ with a neural network

Let us denote with  $g_\lambda(\mathbf{x}; \mathbf{w})$  the output of a fully-connected one-hidden-layer neural network with  $\lambda$  hidden units and a bias term, for a given input vector of technical indicators,  $\mathbf{x}$ , and a parameter vector,  $\mathbf{w}$ . Instead of assuming a particular parametric form for  $f(\mathbf{x}_t | I_t)$  we can estimate it non-parametrically with a neural network, that is we can estimate the 5-day index return as follows:

$$\hat{r}_{t+5} = g_\lambda(\mathbf{x}_t | I_t; \hat{\mathbf{w}}_D) \equiv \xi(\mathbf{x}_t | I_t)$$

where

$$g_\lambda(\mathbf{x}_t | I_t; \hat{\mathbf{w}}_D) = \gamma \left( \sum_{j=1}^{\lambda} w_j \gamma \left( \sum_{i=1}^m w_{ij} x_i + w_{m+1,j} \right) \right) + w_{\lambda+1}$$

3. Taking a long position on the index future contract with the shortest maturity creates a synthetic stock portfolio with the index composition.

**TABLE 3** Selected technical indicators.

Tech. Indicator	Index	Type	Parameters	Transform.
Simple Moving Average	2	Trend	time periods: 10	$\ln(I/I_{t-1})$
Exponential M. A.	1	Trend	time periods: 5	$\ln(I/I_{t-1})$
Exponential M. A.	2	Trend	time periods: 10	$\ln(I/I_{t-1})$
Weighted M. A.	2	Trend	time periods: 10	$\ln(I/I_{t-1})$
Weighted M. A.	2	Trend	time periods: 30	$\ln(I/I_{t-1})$
Weighted M. A.	2	Trend	time periods: 35	$\ln(I/I_{t-1})$
Projection Oscillator	2	Moment.	time periods: 14 slowing per. : 1	n/a
R-squared	1, 2	Trend	time periods : 14	n/a
L. Regression Indicator	1	Trend	time periods : 14	n/a
Linear Regression Slope	2	Trend, Moment.	time periods : 14	n/a
Average True Range	2	Volatility	time periods : 14	n/a
CCI-Standard	1	Moment.	time periods : 14	n/a
Chande Mom. Oscil.	2	Moment.	time periods : 20	n/a
Detrended Price Oscil.	1, 2	Cycle	time periods : 20	n/a
Forecast Oscillator	2	Trend	time periods : 5	n/a
MACD	1, 2	Moment. Trend	time periods : 9	n/a
Mass Index	1,	Moment.	time periods : 25	n/a
Qstick	1, 2	Trend	time periods : 8 method : simple	n/a
Relative Strength Index	2	Moment.	time periods : 7	n/a
Standard Deviation	2	Volatility	time periods : 5 deviations : 1	n/a
Swing Index	1	Moment.	limit move : 3	n/a
TRIX	2	Moment.	time periods : 12	n/a
Ultimate Oscillator	1	Moment.	first cycle : 7 second cycle : 14 third cycle : 28	n/a
Zig Zag	1	Trend	price field : close rev. amount : 5 method : percent	n/a
Parabolic SAR	1	Trend	n/a	n/a
Direct Movement -DI	1	Trend	time periods : 14	n/a

and where  $\hat{\mathbf{w}}_D$  denotes the parameter vector which was estimated from the training dataset  $D$  with the Levenberg-Marquadt training algorithm,  $w_{ij}$  is the weight of the connection between input  $i$  and the hidden unit  $j$ ,  $w_{m+1,j}$  is the weight of the connection between the bias term of the input layer  $m+1$  and the hidden unit  $j$ ,  $w_j$  is the weight of the connection between the hidden unit  $j$  and the output unit and  $w_{\lambda+1}$  is the weight of the connection between the bias term of the hidden layer  $\lambda+1$  and the output unit (see Figure 1). The function  $\gamma$  is the typical asymmetric sigmoid:

$$\gamma(x) = \frac{1}{1 + e^{-x}}$$

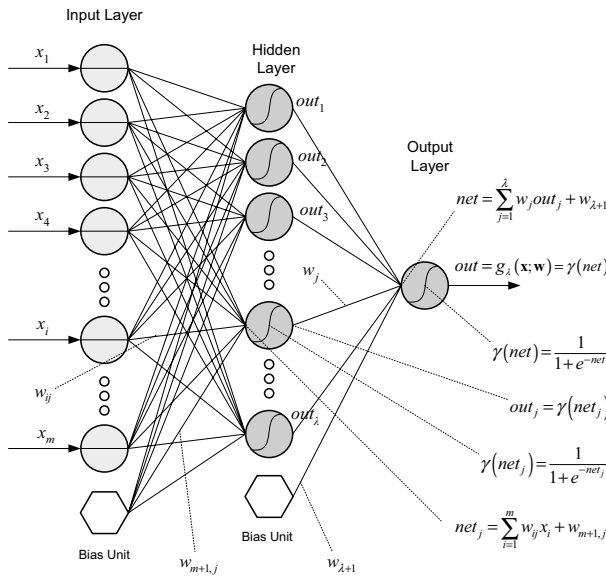


FIGURE 1 Backpropagation neural network with a single hidden layer and a single output unit; from Zapranis (2005).

The number of hidden units  $\lambda$  was estimated on the basis of “the minimum prediction risk principle”. Prediction risk is the expected out-of-sample mean squared error and it was computed algebraically; for a detailed exposition see Refenes and Zapranis (1999) and Zapranis, Refenes (1999). Prediction risk was minimized for  $\lambda = 5$  hidden units.

**2.4. Tested trading strategies**

We tested out-of-sample two simple trading strategies. In the first strategy ( $TS_1$ ) we set the threshold return corresponding to the breakeven transaction

cost to  $c = 0$  (see section 4.2) and in the second strategy ( $TS_2$ ) to  $c = 40$  basis points. Note, that each time the portfolio composition changes from cash to stocks or from stocks to cash, the  $TS_2$  strategy also incurs transaction costs of 0.04 percent, computed on the current portfolio valuation. That is,  $TS_2$  returns are inclusive of transaction costs. The benchmark strategy ( $TS_{B\&H}$ ) was a buy-and-hold portfolio. For  $TS_2$  there are three possible signals (Buy, Sell, Neutral) and the resulting portfolio compositions at the end of day  $t$  are given in Table 2. For  $TS_1$  there are only two possible signals (Buy, Sell) which are generated from the following rule:

if  $\hat{r}_{t+h} > 0$  then  $S_t = \text{Buy}$   
 else if  $\hat{r}_{t+h} < 0$  then  $S_t = \text{Sell}$

The resulting portfolio compositions at the end of day  $t$  are given in Table 2, for signals “Buy” and “Sell”.  $TS_1$  returns do not account for transaction costs.

**5. Results**

In Table 4 we can see the net returns for the out-of-sample period from 2 January 2001 to 2 November 2005.

TABLE 4 Overall returns for the out-of-sample period for DJIA and S&P 500.

Strategy	$TS_1$	$TS_2$	$TS_{B\&H}$
DJIA	65.34 %	60.41 %	-1.62 %
S&P 500	43.80 %	36.71 %	-5.33 %

For the particular period the returns of the two indices are negative, with S&P 500 being the worst performer. In particular, the buy-and-hold strategy returns ( $TS_{B\&H}$ ) are -1.62 percent for the DJIA and -5.33 percent for the S&P 500. At the same time, the returns of the strategies  $TS_1$  and  $TS_2$  are on average over 62 percent for the DJIA and over 40 percent for S&P 500. When trading costs of 40 basis points are taken into account (strategy  $TS_2$ ) then the performance deteriorates slightly. However, the overall return for the out-of-sample period is still very satisfactory, i.e., 60.41 percent for the DJIA and 36.71

**TABLE 5** Standard test results for the out-of-sample period for DJIA and S&P 500.

Test	N(Buy)	N(Sell)	Buy	Sell	Buy > 0	Sell > 0	Buy – Sell
Panel A: DJIA							
$TS_1$ : $c = 0$	10	9	0.00056 (15.509)	-0.00051 (-13.537)	0.700	0.444	0.00108 (20.575)
$TS_2$ : $c = 0.004$	7	6	0.00082 (19.025)	-0.00080 (-17.164)	0.714	0.166	0.00162 (25.589)
Panel C: S&P 500							
$TS_1$ : $c = 0$	13	12	0.00028 (8.858)	-0.00029 (-8.615)	0.692	0.333	0.00057 (12.413)
$TS_2$ : $c = 0.004$	12	11	0.00039 (11.726)	-0.00038 (-10.924)	0.583	0.272	0.00077 (16.076)

“N(Buy)” and “N(Sell)” are the number of buy and sell signals generated from the trading strategy. Numbers in parentheses are standard  $t$ -ratios testing the difference between of the mean buy and sell from the unconditional 5-day mean, and buy-sell from zero. “Buy > 0” and “Sell > 0” are the fraction of buy and sell returns greater than zero.

percent for the S&P 500, when at the same time the corresponding returns of the buy-and-hold strategies are both negative. As we will see in the following analysis the inclusion of a threshold return of  $c = 40$  in  $TS_2$  enhances the performance of the trading strategy, mainly because less signals are generated, but overall the trading costs offset any advantage. In Table 5 we summarize standard test results for the out-of-sample period following the analysis of BLL.

Cumulative returns are reported for fixed 5-day periods after signals. “N(Buy)” and “N(Sell)” (columns 2 and 3) are the number of buy and sell signals generated from the trading strategy. Numbers in parentheses are standard  $t$ -statistics testing the difference between of the mean buy and sell from the unconditional 5-day mean, and buy-sell from zero. “Buy > 0” and “Sell > 0” (columns 6 and 7) are the fraction of buy and sell returns greater than zero. “Buy-Sell” (column 8) is the difference between the mean “Buy” and “Sell” returns (columns 4 and 5).

The  $t$ -statistics for the buys and sells are,

$$\frac{\mu_r - \mu}{\sqrt{\sigma^2/N + \sigma^2/N_r}}$$

where  $\mu_r$  and  $N_r$  are the mean return and number of signals for the buy and sell, and  $\mu$  and  $N$  are the unconditional mean and number of observations,  $\sigma^2$  is the estimated variance for the entire sample. For the buy-sell the  $t$ -statistic is,

$$\frac{\mu_b - \mu_s}{\sqrt{\sigma^2/N_b + \sigma^2/N_s}}$$

where  $\mu_b$  and  $N_b$  are the mean return and number of signals for the buys and  $\mu_s$  and  $N_s$  are the mean return and number of signals for the sells.

The first thing that we observe in Table 5 is that on average in more than 67 percent of the cases a buy signal corresponded to a positive return and in more than 30 percent of the cases a sell signal corresponded to a positive return. Obviously we expect from a trading strategy that the generated buy signals correspond to positive returns more than 50 percent of the time, and the sell signals less than 50 percent of the time. In that respect both  $TS_1$  and  $TS_2$  performed very satisfactorily.

Furthermore, the number of generated buy and sell signals is on average for the DJIA 3.9 per year for  $c = 0$  and 2.7 per year for  $c = 40$  basis points. For the S&P 500 the corresponding figures are 5.2 per year for  $c = 0$  and 4.8 per year for  $c = 40$  basis points. These figures indicate that the strategies are not performing noise-trading. This is important, since the frequency of transactions can eliminate the profitability of most trading strategies.

We also see that all the buy-sell differences are positive and the  $t$ -statistics for those differences are highly significant, rejecting the null hypothesis of equality with zero. Setting the threshold return to  $c = 40$  basis points increased the spread between buy and sell returns.

We also observe that, the mean buy returns are

all positive and statistically significant, i.e., we reject the null hypothesis that the returns equal the unconditional 5-day returns at the 5 percent significance level using a two-tailed test. In particular, for the DJIA the annualized returns are 2.912 percent for  $c = 0$  ( $0.056 \times 52$ ) and 4.264 percent for  $c = 40$  basis points. From Table 1, the unconditional 5-day return for the DJIA is -0.01 percent for the test period or -0.52 percent annualized. For the S&P 500 the annualized returns are 1.456 percent for  $c = 0$  and 2.028 percent for  $c = 40$  basis points. From Table 1, the unconditional 5-day return for the S&P 500 is -0.003 percent for the test period or -1.56 percent annualized. Overall, compared with the unconditional returns for the same period, the mean returns of both strategies are quite substantial.

Finally, the mean sell returns are also noteworthy. They are all negative, statistically significant and they are based on about 40% of all trading days. BLL commenting on a similar finding note that “return predictability can reflect either: (1) changes in expected returns that result from an equilibrium model, or (2) market inefficiency”. And they continue “Although rational changes in expected returns are possible it is hard to imagine an equilibrium model that predicts negative returns over such a large fraction of trading days”.

## 6. Conclusions

In this paper we have used neural networks as a nonparametric platform for implementing simple technical trading strategies. Incorporating trading costs, a simple trading strategy based on the 5-day return forecasts of a neural network returned a profit of 60.41 percent when applied to the DJIA, while in the same out-of-sample period the index dropped by -1.62 percent. A similar picture emerged for S&P 500. The neural network returned a profit of 36.71 percent, while the index dropped by -5.33 percent. Moreover, our standard test results are in line with those of BLL. Buy signals consistently generated higher returns than sell signals and the returns following sell signals were negative, which is not easily explained by any of the currently existing equilibrium models. Our results indicate that there is predictive power in the technical indicators, a finding that can be regarded as evidence against return randomness. This is a very interesting conclusion, since we have used very simple strategies based *only* on technical indicators. However, technical an-

alysts rely *also* on geometric patterns such as head-and-shoulders, flags, etc *and* certain rules, such as the confirmation rule (a signal must be confirmed by several indicators and patterns). Overall, the results of our study indicate that the nonparametric approach reveals the existence of a more complicated return generating mechanism than those suggested from studies using linear models.

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# Comparative Investigation of the Dividend Policy of Cypriot Firms traded in Cyprus Stock Exchange Using a New Methodology of Correspondence Analysis

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**Abstract** – This paper presents an analysis based on a recently survey of the dividend policies of the listed firms in the Cypriot Stock Exchange. For the analysis we use a new methodology of correspondence analysis for the comparative evaluation of the opinions of members two or more different groups, as for criteria which are formulated in scales “Likert”. Especially, we investigate, in a 5-degree scale and in a 2-degree scale of evaluation, the effect of several factors on the corporate dividend policy firstly taking into account all the firms of our sample and then the groups of firms according to their total turnover. We found that they are significant differences between the factors that affect the dividend policy of the groups of Cypriot firms.

## 1. Introduction

A significant amount of researchers have studied dividend policies both in US and Europe. However, there is hardly any research done on this topic neither in Greece nor in Cyprus. The objective of this paper is the comparative evaluation of the opinions of different groups of Cypriot firms about the factors which affect their dividend policy.

We used a structured questionnaire that was constructed by Professor Dr. Stuart Archbold of Kingston University UK. He used the same questionnaire for the listed firms in the London Stock Exchange (LSE) and for that reason we did not need to pilot the questionnaire in our sample.

The questionnaire was promoted with the help of Cypriot students of the Accounting and Finance department of the University of Macedonia in November 2005. The firms responded to the questionnaire were listed firms in the Cypriot Stock Exchange. The total number of responses was 53 firms which reaches almost 50% response rate, which to our opinion

is a very satisfactory response rate. We concentrated all 53 questionnaires in February 2006.

The data were formulated into special table of “coincidences”, which summarize and shows the desired information with the correspondence analysis.

We divide the paper into four sections. In the second section we present a new method for comparative examination with correspondence analysis, which was used in order to obtain results. In the third section we present the results of our research, and finally in the last section we reach our conclusions.

## 2. Methodology: A new method for comparative examination with correspondence analysis

As we know, the correspondence analysis is applied in tables of coincidences of two nominal variables, also in the tables 0-1 (multiple correspondence analysis) in the table Burt and generally in tables of positive numbers that the profiles of lines and columns have meaning (Lebart 2002).

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Complete theoretical study of correspondence analysis we have for the table of coincidences, the reasonable table (0-1) and the table Burt.

However the possibilities of correspondence analysis elects, at our opinion, the application in special tables of “coincidences” that result from suitable format of data of the research subject, that summarizes, lists up and appears the asked information.

Such a table is the proposed table that is offered specifically for the comparative evaluation.

Initially we present the form of subjects in which is applied the proposed methodology:

A total n of individuals is dismembered in two or more groups different between them. Is asked the comparative evaluation of opinions of individuals of groups for criteria-factor E1 E2 E3 ..., Ep that are formulated in scales “Likert”, all of k-gradations. The proposed methodology for the confrontation of such subjects, that we described previously, is recommended in the manufacture of special table of coincidences and in his analysis with the correspondence analysis.

**Manufacture of proposed special table of coincidences**

We suppose for facility of action that the total of n of individuals divided in two groups of individuals A and B with n1 and n2 crowd of individuals respectively ( $n_1 + n_2 = n$ ), as well as that p factors are formulated in 3-degree scale (nothing-mediocre - too much). For each group e.g. group A we create initially the logic table.

**TABLE 1** The logic table.

	E11	E12	E13	E21	E22	E23	.....	Ep1	Ep2	Ep3
a <sub>1</sub>	0	1	0	1	0	0		1	0	0
a <sub>2</sub>	1	0	0	1	0	0		0	0	1
a <sub>n1</sub>	0	1	0	0	1	0		0	1	0

Where ai the individuals and Eik are the gradation k for the criterion Ei.

Then we add the lines of logic table and result the “adding” table line:

**TABLE 2** The “adding” table line.

E1			E2			Ep			
E11	E12	E13	E21	E22	E23	.....	Ep1	Ep2	Ep3
K <sub>11</sub>	K <sub>12</sub>	K <sub>13</sub>	K <sub>21</sub>	K <sub>22</sub>	K <sub>23</sub>	.....	K <sub>p1</sub>	K <sub>p2</sub>	K <sub>p3</sub>

Number e.g. K23 counterbalances with the crowd of individuals that selected for factor E2 gradation 3. It is obvious that sum K21 + K22 + K23 counterbalances with the crowd of n1 of all individuals of group A.

(Generally  $K_{i1} + K_{i2} + K_{i3} = n_1$ , the = 1,2,3)

Following from the “adding” table line we create following table px3:

**TABLE 3** Table of distribution of group A.

	A			Total
	A1	A2	A3	
E1	K <sub>11</sub>	K <sub>12</sub>	K <sub>13</sub>	n <sub>1</sub>
E2	K <sub>21</sub>	K <sub>22</sub>	K <sub>23</sub>	n <sub>1</sub>
Ep	K <sub>p1</sub>	K <sub>p2</sub>	K <sub>p3</sub>	n <sub>1</sub>
Total	K <sub>.1</sub>	K <sub>.2</sub>	K <sub>.3</sub>	pn <sub>1</sub>

This table shows the distribution of n1 of individuals of group A in the 3 gradations of 3-degree scale for each factor from the E1, E2, ..., Ep.

Similarly is precisely manufactured the table of distribution of group B.

**TABLE 4** Table of distribution of group B.

	B			Total
	A1	A2	A3	
E1	K' <sub>11</sub>	K' <sub>12</sub>	K' <sub>13</sub>	n <sub>2</sub>
E2	K' <sub>21</sub>	K' <sub>22</sub>	K' <sub>23</sub>	n <sub>2</sub>
Ep	K' <sub>p1</sub>	K' <sub>p2</sub>	K' <sub>p3</sub>	n <sub>2</sub>
Total	K' <sub>.1</sub>	K' <sub>.2</sub>	K' <sub>.3</sub>	pn <sub>2</sub>

The table that follows is the proposed table for the comparative evaluation of factors E1, E2, ..., Ep from two (or more generally) groups A, B and it results from the horizontal “conjunction of” tables A and B.

**TABLE 5** Table of comparative evaluation of group A, B.

	A			B			Total
	A1	A2	A3	B1	B2	B3	
E1	K <sub>11</sub>	K <sub>12</sub>	K <sub>13</sub>	K' <sub>11</sub>	K' <sub>12</sub>	K' <sub>13</sub>	n <sub>1</sub> +n <sub>2</sub> =n
E2	K <sub>21</sub>	K <sub>22</sub>	K <sub>23</sub>	K' <sub>21</sub>	K' <sub>22</sub>	K' <sub>23</sub>	n
Ep	K <sub>p1</sub>	K <sub>p2</sub>	K <sub>p3</sub>	K' <sub>p1</sub>	K' <sub>p2</sub>	K' <sub>p3</sub>	n
Total	K <sub>.1</sub>	K <sub>.2</sub>	K <sub>.3</sub>	K' <sub>.1</sub>	K' <sub>.2</sub>	K' <sub>.3</sub>	pn

**Note:** The lines of table are isobar (they have constant sum equal with the size of n of total).

Following in the table of comparative evaluation we apply the correspondence analysis.

If for example the points columns A2, B3 are found neighbor of point line E2 in the first factorial level, it results that group A evaluated criterion E2 with the degree mediocrely while group B with the degree too much. With this significance become the comparison of opinions of different groups A and B for criteria E1, E2, ..., Ep.

The estimation of the weights center and the calculations of inertias which follows are necessary for the accurate explanation of the results of correspondence analysis.

**Weights centers and inertia**

A) Initially we determine the centre of weight of profiles of columns of table 3 as well as the inertia that corresponds in group A.

**TABLE 6** Table of profiles of columns for A.

				Weight of lines
E1	$\frac{K_{11}}{K_{.1}}$	$\frac{K_{12}}{K_{.2}}$	$\frac{K_{13}}{K_{.3}}$	$\frac{n_{1.}}{n_{i.} \rho}$
E2	$\frac{K_{21}}{K_{.1}}$	$\frac{K_{22}}{K_{.2}}$	$\frac{K_{23}}{K_{.3}}$	$\frac{n_{2.}}{n_{i.} \rho}$
Ep	$\frac{K_{p1}}{K_{.1}}$	$\frac{K_{p2}}{K_{.2}}$	$\frac{K_{p3}}{K_{.3}}$	$\frac{n_{p.}}{n_{i.} \rho}$
Weight of columns	$\frac{K_{.1}}{n_{i.} \rho}$	$\frac{K_{.2}}{n_{i.} \rho}$	$\frac{K_{.3}}{n_{i.} \rho}$	

It is known that margins column of this table (weights of lines) that is to say table

point  $g = \begin{bmatrix} \frac{1}{p} \\ \frac{1}{p} \\ \cdot \\ \cdot \\ \frac{1}{p} \end{bmatrix}$ , is the centered weight of the points

of the profile of columns. We calculate the inertia  $I_A$  of the points of profile of columns in table 6.

If  $I_1$  is the inertia of the 1<sup>st</sup> profile column, that is

point  $A1 = \begin{bmatrix} \frac{K_{11}}{K_{.1}} \\ \frac{K_{21}}{K_{.2}} \\ \cdot \\ \cdot \\ \frac{K_{p1}}{K_{.1}} \end{bmatrix}$ ,

With weight  $m_1 = \frac{K_{.1}}{n_{i.} \rho}$ , then

$$\begin{aligned}
 I_1 &= m_1 d^2(A1, g) = \frac{K_{.1}}{n_{i.} \rho} \sum_{i=1}^p \frac{1}{\frac{1}{K_{.1}} \frac{1}{p}} \left( \frac{K_{i1}}{K_{.1}} - \frac{1}{p} \right)^2 = \\
 &= \frac{K_{.1}}{n_{i.}} \sum_{i=1}^p \frac{1}{K_{.1}^2 p^2} (pK_{i1} - K_{.1})^2 = \\
 &= \frac{1}{n_{i.} K_{.1} \rho^2} \sum_{i=1}^p (p^2 K_{i1}^2 - 2pK_{.1}K_{i1} + K_{.1}^2) = \\
 &= \frac{1}{n_{i.} K_{.1} \rho^2} (p^2 \sum_{i=1}^p K_{i1}^2 - 2pK_{.1} \sum_{i=1}^p K_{i1} + \sum_{i=1}^p K_{.1}^2) = \\
 &= \frac{1}{n_{i.} K_{.1} \rho^2} (p^2 \sum_{i=1}^p K_{i1}^2 - 2pK_{.1}^2 + pK_{.1}^2) = \\
 &= \frac{1}{n_{i.} K_{.1} \rho^2} (p^2 \sum_{i=1}^p K_{i1}^2 - pK_{.1}^2) = \\
 &= \frac{1}{n_{i.} K_{.1}} \left( \sum_{i=1}^p K_{i1}^2 - \frac{K_{.1}^2}{p} \right) = \\
 &= \frac{1}{n_{i.}} \left( \frac{\sum_{i=1}^p K_{i1}^2}{K_{.1}} - \frac{K_{.1}}{p} \right) =
 \end{aligned}$$

$$\begin{aligned}
 \text{So, } I_A = I_1 + I_2 + I_3 &= \frac{1}{n_1} \left( \frac{\sum_{i=1}^p K_{i1}^2}{K_{.1}} + \frac{\sum_{i=1}^p K_{i2}^2}{K_{.2}} \right. \\
 &+ \left. \frac{\sum_{i=1}^p K_{i3}^2}{K_{.3}} - \frac{K_{.1} + K_{.2} + K_{.3}}{p} \right) = \\
 &= \frac{1}{n_1} \left( \frac{\sum_{i=1}^p K_{i1}^2}{K_{.1}} + \frac{\sum_{i=1}^p K_{i2}^2}{K_{.2}} + \frac{\sum_{i=1}^p K_{i3}^2}{K_{.3}} - \frac{pn_1}{p} \right) = \\
 &= \frac{1}{n_1} \left( \frac{\sum_{i=1}^p K_{i1}^2}{K_{.1}} + \frac{\sum_{i=1}^p K_{i2}^2}{K_{.2}} + \frac{\sum_{i=1}^p K_{i3}^2}{K_{.3}} - n_1 \right) \quad (1)
 \end{aligned}$$

Similarly, we have for the table of columns profile which correspond in group B, that the weight center

is the same point  $\begin{bmatrix} \frac{1}{p} \\ \frac{1}{p} \\ \frac{1}{p} \\ \cdot \\ \cdot \\ \cdot \\ \frac{1}{p} \end{bmatrix} = g$  and the inertia of this table

$$\text{is } I_B = \frac{1}{n_2} \left( \frac{\sum_{i=1}^p K'_{i1}{}^2}{K'_{.1}} + \frac{\sum_{i=1}^p K'_{i2}{}^2}{K'_{.2}} + \frac{\sum_{i=1}^p K'_{i3}{}^2}{K'_{.3}} - n_2 \right) \quad (2)$$

B) Then we calculate the centre of weight of table of profiles of columns of table of comparative evaluation.

**TABLE 6** Table of profile of columns of the table of comparative evaluation.

	$\frac{K_{11}}{K_{.1}}$	$\frac{K_{12}}{K_{.2}}$	$\frac{K_{13}}{K_{.3}}$	$\frac{K'_{11}}{K'_{.1}}$	$\frac{K'_{12}}{K'_{.2}}$	$\frac{K'_{13}}{K'_{.3}}$	Weights of lines
E1	$\frac{K_{11}}{K_{.1}}$	$\frac{K_{12}}{K_{.2}}$	$\frac{K_{13}}{K_{.3}}$	$\frac{K'_{11}}{K'_{.1}}$	$\frac{K'_{12}}{K'_{.2}}$	$\frac{K'_{13}}{K'_{.3}}$	$\frac{n}{n\rho} = \frac{1}{\rho}$
E2	$\frac{K_{21}}{K_{.1}}$	$\frac{K_{22}}{K_{.2}}$	$\frac{K_{23}}{K_{.3}}$	$\frac{K'_{21}}{K'_{.1}}$	$\frac{K'_{22}}{K'_{.2}}$	$\frac{K'_{23}}{K'_{.3}}$	$\frac{n}{n\rho} = \frac{1}{\rho}$
Ep	$\frac{K\rho_1}{K_{.1}}$	$\frac{K\rho_2}{K_{.2}}$	$\frac{K\rho_3}{K_{.3}}$	$\frac{K'\rho_1}{K'_{.1}}$	$\frac{K'\rho_2}{K'_{.2}}$	$\frac{K'\rho_3}{K'_{.3}}$	$\frac{1}{\rho}$
Weights of columns	$\frac{K_{.1}}{n\rho}$	$\frac{K_{.2}}{n\rho}$	$\frac{K_{.3}}{n\rho}$	$\frac{K'_{.1}}{n\rho}$	$\frac{K'_{.2}}{n\rho}$	$\frac{K'_{.3}}{n\rho}$	

Margins column (weights of lines), that is to say the centre weight of points profile of columns of table

of comparative evaluation is  $\begin{bmatrix} \frac{1}{p} \\ \frac{1}{p} \\ \frac{1}{p} \\ \cdot \\ \cdot \\ \cdot \\ \frac{1}{p} \end{bmatrix}$ , same with the

centres weights of tables that we presented already, that is to say the g.

This identification of centers of weights of three tables allows we seek the relation of inertia  $I_{AB}$  of comparative table of evaluation with inertias  $I_A, I_B$  tables, that correspond in groups A and B, when they are analyzed separately with the correspondence analysis.

As it was presented for inertia  $I_A$ , proportionally precisely we lead that

$$\begin{aligned}
 I_{AB} &= \frac{1}{n} \left[ \left( \frac{\sum_{i=1}^p K_{i1}}{K_{.1}} + \frac{\sum_{i=1}^p K_{i2}}{K_{.2}} + \frac{\sum_{i=1}^p K_{i3}}{K_{.3}} \right) \right. \\
 &+ \left. \left( \frac{\sum_{i=1}^p K'_{i1}}{K'_{.1}} + \frac{\sum_{i=1}^p K'_{i2}}{K'_{.2}} + \frac{\sum_{i=1}^p K'_{i3}}{K'_{.3}} \right) - n \right] = \\
 &= \frac{1}{n} \left[ \left( \frac{\sum_{i=1}^p K_{i1}}{K_{.1}} + \frac{\sum_{i=1}^p K_{i2}}{K_{.2}} + \frac{\sum_{i=1}^p K_{i3}}{K_{.3}} - n_1 \right) \right. \\
 &+ \left. \left( \frac{\sum_{i=1}^p K'_{i1}}{K'_{.1}} + \frac{\sum_{i=1}^p K'_{i2}}{K'_{.2}} + \frac{\sum_{i=1}^p K'_{i3}}{K'_{.3}} - n_2 \right) \right] = \\
 &= \frac{1}{n} (n_1 I_A + n_2 I_B) \quad (\text{from equation 1 and 2})
 \end{aligned}$$

that is  $I_{AB} = \frac{n_1 I_A + n_2 I_B}{n}$  (3)

The equality (3) shows that the inertia of table of comparative evaluation is the gravimetric medium inertias  $I_A$  and  $I_B$  that corresponds in groups A and B, with factors of gravity the crowds of  $n_1, n_2$  of respectively groups A and B.

More generally is in effect the equality

$$I = \frac{n_1 I_{A_1} + n_2 I_{A_2} + \dots + n_k I_{A_k}}{n}$$

Where  $I$ , is the inertia of the table of comparative evaluation,  $n_i$  is the population of group  $A_i$  ( $A_1, A_2, \dots, A_k$  they are the groups in which was dismembered the initial total) and  $I_{A_i}$  is the inertia of group  $A_i$ .

### 3. Data Analysis: Comparative examination of the factors which affect to the corporate dividend policy of the cypriot firms

Correspondence analysis analyzes substantially the inertia (variation) in the principal axis, that is records the main directions of dispersion. In the proposed method of comparative evaluation of opinions of groups  $A, B$ , the inertia of table of comparative evaluation is gravimetric medium (equation 3) inertias of groups  $A, B$ , with weight coefficients respectively the number of  $n_1, n_2$  of the groups. In the case of groups of firms  $K_1$  (firms with total turnover  $< \text{€}100$  millions, 'small size firms') that is most ( $n_1 = 40$  big) and  $K_2$  (firms with total turnover  $> \text{€}100$  millions, 'big size firms') that is considerably less ( $n_2 = 13$  small) we interested for the 'parity' of opinions of groups  $K_1$  and  $K_2$ , because the opinion of firms of group  $K_2$  is of great importance. For this reason in the table of comparative evaluation we will place not the absolute frequencies but the relative frequencies of groups so we have  $n_1 = n_2 = 1$ . As a result the total inertia is:

$$I_{K_1 K_2} = \frac{I_{K_1} + I_{K_2}}{2}$$

With the following analysis we investigate the effect of each one of the below 17 factors to the corporate dividend policy of the cypriot firms.

The 17 factors with their code name are:

- E1:** Temporary change in earnings
- E2:** A sustainable change in earnings
- E3:** Stability of future earnings
- E4:** Having extra cash/liquid assets relative to our desired cash holding
- E5:** The dividend policies of competitors or other companies in our industry
- E6:** Paying out to reduce cash thereby encouraging efficient decision making
- E7:** Personal taxes stockholders pay when receiving dividend
- E8:** The availability of good investment opportunities
- E9:** The influence of institutional shareholders
- E10:** Merger and acquisition strategies
- E11:** Flotation costs to issuing additional equity
- E12:** Maintaining consistency with historic dividend policy
- E13:** The possibility that paying dividends indicates to investors that the company is running low on profitable investments
- E14:** Attracting retail investors to purchase our stock
- E15:** Attracting institutional investors to purchase our stock
- E16:** Attracting institutional investors because they monitor management decisions
- E17:** Market price of our stock (if our stock is good investment relative to its true value)

### Analysis 1

In this case we investigate, in a 5-degree scale of evaluation (no means, little, mediocrely, much, very much), the effect of each one of the above 17 factors to the corporate dividend policy of all the firms of our sample.

We have the following results:

#### a) Eigenvalues histogram

TOTAL INACTIVITY 0.19692				
AXIS	INACTIVITY	%EXPLANATION	TOTAL	EIGENVALUES HISTOGRAM
1	0.1515058	76.94	76.94	*****
2	0.0274042	13.92	90.85	*****
3	0.0142266	7.22	98.08	****
4	0.0037869	1.92	100.00	*

The rate of explanation of the first factorial axis (76,94%) is too high and helps to understand the phenomenon almost in his entirety. The second factorial axis with explanatory importance 13,92% supplements with the first factorial axis of the 90,85% of the investigated phenomenon.

#### b) Coordinates COR and CTR

	#F1	COR	CTR	#F2	COR	CTR	#F3	COR	CTR	#F4	COR	CTR
E1	-487	720	90	259	204	142	-115	40	53	106	34	173
E2	659	948	166	150	49	48	-27	1	2	17	0	4
E3	818	907	256	255	88	138	-54	3	11	-14	0	2
E4	15	2	0	-183	388	70	226	595	208	34	14	18
E5	-247	873	23	-19	5	0	57	48	13	-71	72	77
E6	-120	553	5	-99	376	20	-16	8	0	-40	61	24
E7	-600	923	137	130	43	36	-111	31	50	19	0	5
E8	89	241	3	105	338	23	115	405	54	-23	14	7
E9	464	926	82	-103	44	22	-45	8	8	69	20	73
E10	155	356	9	-164	396	56	110	178	49	-68	67	70
E11	-372	609	52	-237	245	118	-181	142	132	-17	1	4
E12	235	378	21	-292	579	179	-29	5	3	72	36	81
E13	-338	579	43	225	257	107	168	144	115	-61	18	56
E14	-264	580	26	43	15	3	195	319	155	100	84	153
E15	142	436	7	37	30	3	-110	257	48	-114	275	196
E16	-344	916	45	-58	25	6	-76	44	23	-42	13	25
E17	187	670	13	-59	64	7	-115	252	53	25	12	9

	#G1	COR	CTR	#G2	COR	CTR	#G3	COR	CTR	#G4	COR	CTR
Sum1	-532	844	320	212	135	283	52	8	32	64	12	186
Sum2	-399	849	185	-45	10	13	-133	94	218	-93	45	400
Sum3	-30	10	1	-276	944	585	7	0	0	59	44	198
Sum4	252	659	98	20	4	3	172	307	488	-54	29	175
Sum5	539	896	390	122	46	110	-135	55	257	25	2	35

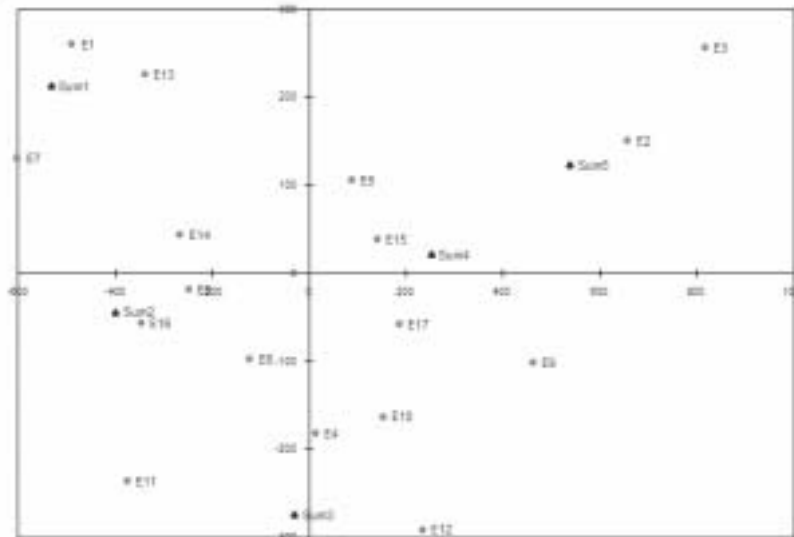
**c) First factorial axis (76,94%)**



In this axis are ordered from left to right the factors that affect from ‘no means’ to ‘very much’ the corporate dividend policy of the firms. The variable SUM1 shows the distribution of opinions of the firms as for all the factors with the characterization by ‘no means’. The SUM2 shows the ‘little’ and so on. Specifically, the corporate dividend policy of the firms is not influenced by the factors E7 and E1, is influenced little by the factors E11, E16, E13, E14 and E5, while is influenced mediocly by the factors E6, E4 and E8. On the other hand corporate

dividend policy is influenced much by the factors E17 and E12 while is influenced very much by the factors E9, E2 and E3. For the construction of this axis contribute from the cloud of the rows the factors E7 with CTR = 137 (coordinate #F1 = -600), E1 with CTR = 90 (coordinate #F1 = -487), E3 with CTR = 256 (coordinate #F1 = -818), E2 with CTR = 166 (coordinate #F1 = 659), while from the cloud of the columns the points SUM1 with CTR = 320 (coordinate #F1 = -532) and SUM5 with CTR = 390 (coordinate #F1 = -539).

**d) First factorial map (1×2)**



The first factorial map 1×2 explains a percentage of 90,85% of inertia and clarifies considerably the phenomenon. According to the firms their corporate dividend policy is not influenced by the factors E1, E7, E13. Mediocly is influenced by the factors E4, E10, E11 and E12. The factors wish influenced highly their

corporate dividend policy are E2 and E3. The factorial map completed with the second factorial axis, improves the real picture of the phenomenon and as a result the factor E9 deviates from the characterization ‘very much’ as we have noticed in the first factorial axis.

### Analysis 2

In this case we investigate, again in a 5-degree scale of evaluation (no means, little, mediocely, much, very much), the effect of each one of the above 17 factors to the corporate dividend policy of the firms of our sample. But this time we have divide the firms into to groups K1 (firms with total turnover < €100 millions, ‘small size firms’) and K2 (firms with total turnover > €100 millions, ‘big size firms’) and we compare their opinions.

We have the following results from the correspondence analysis:

#### a) Eigenvalues histogram

TOTAL INACTIVITY 0.24616				EIGENVALUES HISTOGRAM
AXIS	INACTIVITY	%EXPLANATION	TOTAL	
1	0.1480221	60.13	60.13	*****
2	0.0334939	13.61	73.74	*****
3	0.0230360	9.36	83.10	*****
4	0.0203323	8.26	91.36	*****
5	0.0124118	5.04	96.40	****
6	0.0048275	1.96	98.36	**
7	0.0024519	1.00	99.36	*
8	0.0015679	0.64	99.99	*
9	0.0000126	0.01	100.00	*

The rate of explanation of the first factorial axis (60,13%) is relatively high and helps to explain an important part of the phenomenon. The second factorial axis with explanatory importance 13,61% supplements with the first factorial axis of the 73,74% of the investigated phenomenon.

#### b) Coordinates COR and CTR

	#F1	COR	CTR	#F2	COR	CTR	#F3	COR	CTR	#F4	COR	CTR
E1	-638	700	159	378	246	247	35	2	3	-75	9	15
E2	560	768	122	183	82	58	152	57	58	172	73	85
E3	680	765	181	280	130	136	145	35	53	173	49	85
E4	241	445	22	-124	115	26	2	0	0	-215	352	131
E5	-341	765	45	126	106	27	-94	58	22	14	1	0
E6	-178	494	12	45	32	3	-158	389	62	-32	15	2
E7	-470	560	86	-129	42	28	292	218	215	-53	7	7
E8	136	328	7	-82	116	11	143	361	51	-44	32	5
E9	446	920	78	6	0	0	-96	42	23	-1	0	0
E10	49	26	0	115	146	22	-230	586	133	12	1	0
E11	-430	565	72	-125	47	26	-171	89	73	280	241	224
E12	263	407	27	-179	186	55	-248	359	154	31	5	2
E13	-387	601	58	189	145	62	73	21	13	-114	51	36
E14	-131	63	6	-347	449	208	213	170	114	162	98	75
E15	275	380	29	-93	42	14	1	0	0	-302	457	259
E16	-348	720	47	-138	113	32	-25	3	1	87	45	21
E17	265	636	27	-114	116	22	-43	16	4	-103	94	29

	#G1	COR	CTR	#G2	COR	CTR	#G3	COR	CTR	#G4	COR	CTR
K11	-470	671	143	-104	32	30	285	247	338	-90	24	38
K12	-357	744	84	-106	65	32	-70	28	20	-68	26	22
K13	8	0	0	-128	166	52	-269	738	336	-23	4	2
K14	274	581	54	90	62	26	-29	6	3	16	2	1
K15	574	686	194	279	161	202	128	34	62	183	69	143
K21	-800	645	224	541	295	454	-191	36	81	11	0	0
K22	-614	751	134	57	6	5	96	18	21	96	18	24
K23	-56	15	1	-262	350	183	-46	10	8	339	590	509
K24	180	487	31	-34	16	4	125	234	98	-67	65	30
K25	337	741	122	-19	2	1	-59	22	23	-169	185	223

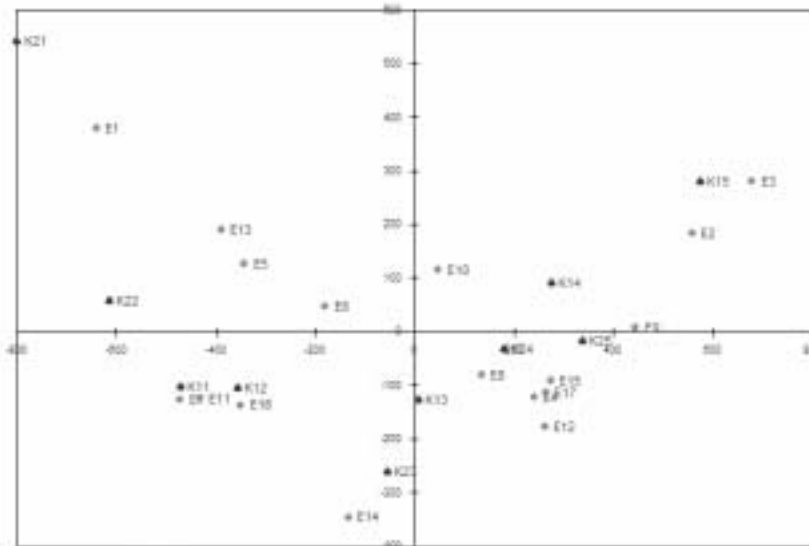
**c) First factorial axis (60,13%)**



In this axis are ordered from left to right the factors that affect from ‘no means’ to ‘very much’ the corporate dividend policy of the firms. We can see the differentiation of opinions of the two groups of firms (small size and big size firms). Specifically, the corporate dividend policy of the firms of K1 is not influenced or influenced little by the factors E11, E13, E16 and E5, while is influenced very much by the factors E2 and E3. From the other hand, the corporate dividend policy of the firms of K2 is not influenced or influenced little by the factor E1, while is influenced very much by the factor E9.

For the construction of this axis contribute from the cloud of the rows the factors E1 with CTR = 159 (coordinate #F1 = -638), E7 with CTR = 86 (coordinate #F1 = -470), E11 with CTR = 72 (coordinate #F1 = -430), E3 with CTR = 181 (coordinate #F1 = 680), E2 with CTR = 122 (coordinate #F1 = 560), while from the cloud of the columns the points K21  $\mu\epsilon$  CTR = 224 (coordinate #F1 = -800), K22 with CTR = 134 (coordinate #F1 = -614), K11 with CTR = 143 (coordinate #F1 = -470) and K15 with CTR = 194 (coordinate #F1 = 574).

**d) First factorial map (1×2)**



The first factorial map 1×2 explains a percentage of 73,74% of the total inertia and clarifies considerably the differences between the opinions of the two groups K1 and K2 of the firms. According to the firms of group K1, their corporate dividend policy is not influenced or influenced little by the factors E7, E11, E16. The factorial map completed with the second factorial axis, improves the real picture of the phenomenon and as a result the

factors E13 and E5 deviate from the characterization ‘no mean’ or ‘little’ as we have noticed in the first factorial axis. Also, the factors which influenced highly their corporate dividend policy are E2 and E3. Reversely, according to the firms of group K2, their corporate dividend policy is not influenced by the factor E1, while moderately is influenced by the factor E14, and very much is influenced by the factor E9.

**Note:** Comparing analysis 1 and 2 we can see for example the fission of the SUM1 which corresponds to the factors E1, E7 of the first factorial map of the analysis 1. It is obvious that in the first factorial map of the analysis 2, SUM1 was split in K11 which corresponds to the factor E7 and in K21 which corresponds to the factor E1.

### Analysis 3

In this analysis we compare as for the above 17 factors the opinions of the two groups K1 (firms with total turnover < €100 millions, 'small size firms') and K2 (firms with total turnover > €100 millions, 'big size firms'), in a 2-degree scale (refusal, affir-

mation) in order to have a more synoptic and safety representation of the opinions of the two groups. For the transformation from the 5-degree scale of evaluation to the 2-degree scale of evaluation we used the program DIAS (Moschidis, 2003).

We have the following results from the correspondence analysis:

#### a) Eigenvalues histogram

TOTAL INACTIVITY 0.09353				
AXIS	INACTIVITY	%EXPLANATION	TOTAL	EIGENVALUES HISTOGRAM
1	0.0802835	85.83	85.83	*****
2	0.0132491	14.17	100.00	*****
3	0.0000000	0.00	100.00	*

The rate of explanation of the first factorial axis (85,83%) is too high and helps to understand the phenomenon almost in his entirety. The second fac-

torial axis with explanatory importance 14,17% supplements with the first factorial axis of the 100,00% of the investigated phenomenon.

#### b) Coordinates COR and CTR

	#F1	COR	CTR	#F2	COR	CTR	#F3	COR	CTR
E1	-459	945	151	110	54	53	558	1403	0
E2	404	886	118	145	113	92	1051	5986	0
E3	495	866	177	194	133	165	1103	4296	0
E4	202	616	29	-160	383	111	935	13220	0
E5	-238	866	40	93	133	38	684	7167	0
E6	-124	879	10	45	120	9	749	32687	0
E7	-360	927	93	-101	72	44	614	2705	0
E8	104	726	7	-64	273	17	879	51888	0
E9	325	996	76	19	3	1	1006	9523	0
E10	54	152	2	127	847	71	851	37578	0
E11	-349	950	87	79	49	27	620	3018	0
E12	182	976	23	-29	23	3	924	25177	0
E13	-248	996	44	14	3	0	678	7527	0
E14	-123	467	10	-131	532	75	750	17468	0
E15	211	485	32	-219	514	208	941	9573	0
E16	-271	999	52	-7	0	0	665	6043	0
E17	187	702	25	-123	297	65	927	17202	0

	#G1	COR	CTR	#G2	COR	CTR	#G3	COR	CTR
K11	-279	851	242	-117	148	255	0	0	16
K12	280	851	243	117	148	256	0	0	477
K21	-409	864	342	161	135	325	-1	0	0
K22	201	864	169	-80	135	160	0	0	503

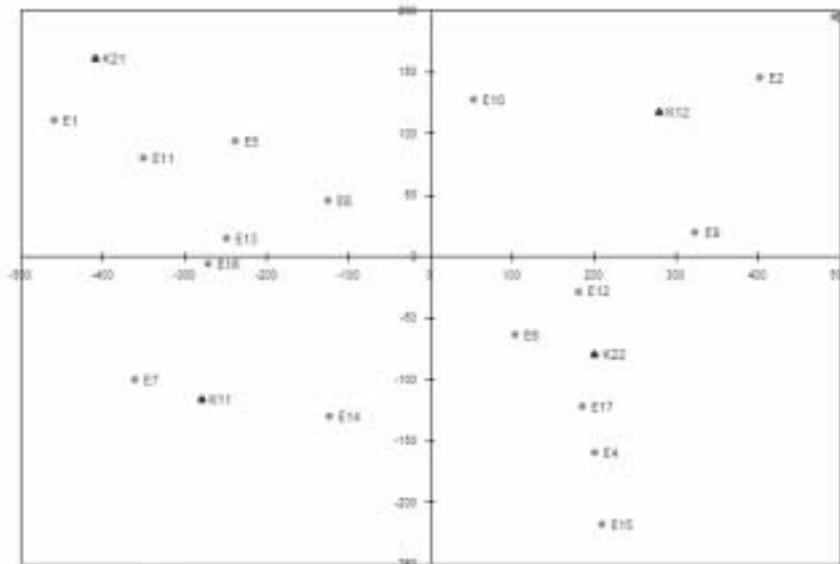
**c) First factorial axis (85,83%)**



From the first factorial axis we can see that the corporate dividend policy of the firms of K1 is not influenced by the factors E16, E13 and E5 while the corporate dividend policy of the firms of K2 is not influenced by the factors E1, E7 and E11. Also, the opinions of the two groups differ for factors wish influence most their corporate dividend policy. So we have that the corporate dividend policy of the firms of K1 is influenced most by the factors E9, E2 and E3, while the corporate dividend policy of the firms of K2 is influenced most by the factors E12, E15 and E17.

For the construction of this axis contribute from the cloud of the rows the factors E1 with CTR = 151 (coordinate #F1 = -459), E7 with CTR = 93 (coordinate #F1 = -360), E11 with CTR = 87 (coordinate #F1 = -349), E3 with CTR = 177 (coordinate #F1 = 495), E2 with CTR = 118 (coordinate #F1 = 404), while from the cloud of the columns the points K21 with CTR = 342 (coordinate #F1 = -409), K11 with CTR = 242 (coordinate #F1 = -279), K12 with CTR = 243 (coordinate #F1 = 280) and K22 with CTR = 169 (coordinate #F1 = 201).

**d) First factorial map (1×2)**



The first factorial map 1×2 explains a percentage of 100% of the total information and clarifies more considerably the differences between the opinions of the two groups K1 and K2 of the firms. In the first axis we have the confrontation of the refusal and affirmation as for the 17 factors.

According to the firms of group K1, their corporate dividend policy is not influenced by the factors E7 and E14. The factorial map completed with the second factorial axis, improves the real picture of the

phenomenon and as a result the factors E16, E13 and E5 deviate from the characterization ‘no mean’ as we have noticed in the first factorial axis. For the firms of group K2 we have that their dividend policy is not influenced by the factors E1, E5 and E11. Also, for the forms of the group K1 the factors wish influenced highly their corporate dividend policy are E2 and E3, while for the forms of the group K2 this factors are E8, E12, E4, E15 and E17.

### Analysis 4

In this case we not only compare as for the above 17 factors the opinions of the two groups K1 (firms with total turnover < €100 millions, 'small size firms') and K2 (firms with total turnover > €100 millions, 'big size firms'), in a 2-degree scale (refusal, affirmation) but also we consider the case in which the firms cut dividend (NK#) or they didn't cut dividend (OK#).

We have the following results from the correspondence analysis:

#### a) Eigenvalues histogram

TOTAL INACTIVITY 0.09855				EIGENVALUES HISTOGRAM
AXIS	INACTIVITY	%EXPLANATION	TOTAL	
1	0.0768775	78.01	78.01	*****
2	0.0150925	15.31	93.32	*****
3	0.0050531	5.13	98.45	***
4	0.0015142	1.54	99.99	*
5	0.0000107	0.01	100.00	*
6	0.0000005	0.00	100.00	*
7	0.0000000	0.00	100.00	*

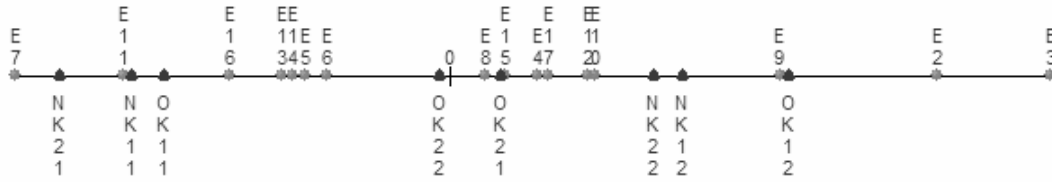
The rate of explanation of the first factorial axis (78,01%) is high enough and helps to understand the phenomenon almost in his entirety. The second factorial axis with explanatory importance 15,31% supplements with the first factorial axis of the 93,32% of the investigated phenomenon.

#### b) Coordinates COR and CTR

	#F1	COR	CTR	#F2	COR	CTR	#F3	COR	CTR	#F4	COR	CTR
E1	-418	919	131	-95	47	34	-76	30	66	20	2	16
E2	474	964	169	-65	17	15	-20	1	4	-63	16	148
E3	584	936	257	-146	58	81	-42	4	19	11	0	4
E4	86	235	5	135	576	71	70	156	57	31	31	38
E5	-139	398	14	-57	66	12	-161	533	294	-11	2	4
E6	-119	734	10	-24	28	2	-7	2	0	-67	234	170
E7	-420	903	132	45	10	7	123	78	174	-38	7	54
E8	36	173	0	76	761	22	-10	12	1	19	52	15
E9	321	881	77	-61	31	14	68	40	54	74	46	210
E10	142	579	15	-87	213	28	67	130	52	-52	75	101
E11	-316	784	75	-155	187	91	58	27	39	11	1	5
E12	135	839	13	53	128	10	-20	17	4	17	13	11
E13	-162	522	19	-150	448	86	-9	1	0	37	27	52
E14	-152	313	17	184	462	130	-128	222	187	7	0	2
E15	55	51	2	236	918	214	23	8	6	36	21	50
E16	-212	833	33	-84	129	26	43	35	21	10	2	4
E17	97	200	7	187	743	135	12	3	1	-50	52	94

	#G1	COR	CTR	#G2	COR	CTR	#G3	COR	CTR	#G4	COR	CTR
NK11	-309	851	177	-71	44	46	106	101	319	18	2	31
NK12	225	851	130	51	44	34	-78	101	235	-14	2	23
OK11	-277	842	223	116	150	203	-25	6	26	-5	0	2
OK12	328	842	265	-139	150	241	29	6	31	4	0	2
NK21	-379	643	132	-257	294	308	-115	59	185	-25	2	28
NK22	197	643	69	133	294	161	59	59	96	12	2	14
OK21	49	10	0	42	7	0	258	271	79	-419	711	694
OK22	-11	10	0	-9	7	0	-54	271	17	85	711	151

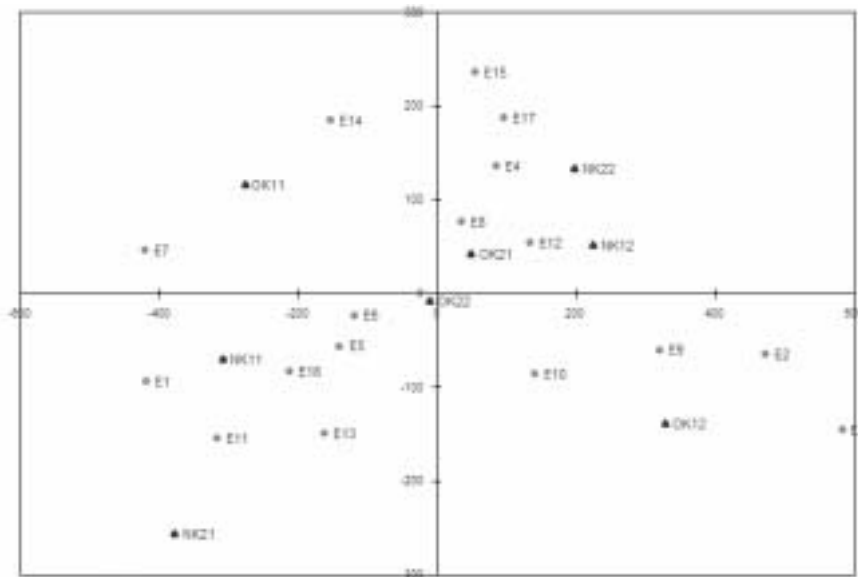
**c) First factorial axis (78,01%)**



From the first factorial axis we can see that the corporate dividend policy of the firms of K1 which cut dividend NK1 and these which didn't cut dividend OK1 is not influenced by the factors E11 while the corporate dividend policy of the firms of K2 which cut dividend NK2 is not influenced by the factor E7. The firms of K2 which didn't cut dividend OK2 support that their dividend policy is not influenced by the factors E8 and E15. Finally, the corporate dividend policy of the firms of K1 which didn't cut dividend is influenced most by the factors E9, E2 and E3.

For the construction of this axis contribute from the cloud of the rows the factors E1 with CTR = 131 (coordinate #F1 = -418), E7 with CTR = 132 (coordinate #F1 = -420), E3 with CTR = 257 (coordinate #F1 = 584), E2 with CTR = 169 (coordinate #F1 = 474), while from the cloud of the columns the points NK21 with CTR = 132 (coordinate #F1 = -379), NK11 with CTR = 177 (coordinate #F1 = -309) and OK12 with CTR = 265 (coordinate #F1 = 328).

**d) First factorial map (1x2)**



The first factorial map 1x2 explains a percentage of 93,32% of the total inertia. According to the firms of group NK1, their corporate dividend policy is not influenced by the factors E1 και E16. The factorial map completed with the second factorial axis, improves the real picture of the phenomenon and as a result the factor E11 deviate from the characterization 'no mean' as we

have noticed in the first factorial axis while we can see that the dividend policy of the firms of group NK2 is not influenced by this factor (E11). Finally, the corporate dividend policy of the firms of K1 which didn't cut dividend OK1 is not influenced by the factors E7, and E14 while is influenced most by the factors E2, E3 and E9.

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# The role of self-government in the emergence of corporate social responsibility in Greece

INVESTMENT  
RESEARCH &  
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**Abstract** – The concept of Corporate Social Responsibility (CSR) plays an important role over the last decades in the reception of information for the social and environmental task of enterprises. The equally important role of the local government in the financial, social and cultural development of the area constituted the motive for the collection of data as part of a survey that examines the social responsibility of enterprises. The purpose of this paper is to determine the level of the achieved cooperation between the two parties as well as to investigate the degree at which the information of the social responsibility of enterprises becomes known to the municipalities through the financial and accounting reports that prove their social task. The gathering of information was carried out with questionnaires that led to particular conclusions on the basis of the above issues. The results of the survey show reduced assumption of corporate social responsibility by enterprises as well as reduced supply of information to the municipality for the use or not of good methods. At the same time the results reveal at a significant degree, the inability of the existence infrastructure of the municipalities for the promotion of the cooperation with the enterprises.

## 1. Introduction

The idea of social responsibility has always played an important role in the configuration of the everyday life perception in almost all societies. The social responsibility can express itself under general form, that covers all the activities that have social repercussions and under special form referring to the corporate social responsibility. The social responsibility of enterprises concerns internal factors (conditions of work, wage policy etc.) as well as external factors (effect of enterprise in the environment, in human factor etc.). Its application is met not only in the level of a public but also in the private sector, since the activities that take place in those two sectors have both social repercussions. The information of public from the enterprising units requires the existence of systematic method of treatment and

exchange of information. A lot of members of the enterprising community corresponded positively in the new requirements through the syntax of accounting and financial reports expressed sometimes in monetary terms and sometimes in descriptive and qualitative presentations. Thus the term of “Accounting of Enterprise” or “Social Accounting” was first used in the international bibliography, referring to the syntax of the aforementioned cases. Considering however the information of Local Self-government to be of equal importance with the information of public, being a separate entity that works for similar aims, such as the promotion of the economic and social interests of its residents. Therefore in the framework of this particular study an effort takes place to investigate the existence of social responsibility information exchange between enterprises

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and municipalities as well as the degree of collaboration of the two parts for the achievement of the described goals.

## 2. The evolution of corporate social responsibility

The Corporate Social Responsibility (CSR), which will be the particular research subject of the present study, first appeared between the end of the 19<sup>th</sup> and the beginning of the 20<sup>th</sup> century through numerous government owned social programs. It was not until 1880 that 8-hour working day was established, the work of minors is under state control, trade-union rights are recognized, etc. In the following period the concept of CSR is also expanding in the broader enterprising field, covering both the private and government owned sector with the participation of workers in the administration of enterprises. Regarding the private enterprise during 50's the need for social responsibility is amplified whereas the social obligations of modern enterprise are emphasized. In 1960 the approach that enterprises exist in order to serve the society and should be responsible for their actions is starting to prevail. To deferred opinions have been formulated concerning those social requirements: The first declared that enterprise activities should not harm people, society and the environment while the second, provided that the enterprises possess significant power, required them to contribute to the social prosperity as well as to the solution of social problems. The first opinion was considered preventive while the second corrective (McFarland, 1982). Thus the CSR begins progressively to adopt a worldwide character expressed differently in each community, according to the needs and the expectations of each society emanating from their way of life and their cultural status.

However the dissemination of CSR concept does not stop here. The involvement of European Committee as well as of international organisms to convince enterprises for the adoption of CSR practices, contributed in the recognition of its importance. Moreover the raise of interest for detailed knowledge regarding the content and the activities that concern CSR, has become evident. The call that chairman Delors addressed to the European companies in 1993 against social exclusion, resulted in intense mobilisation and to the growth of European networks of enterprises. Recently, in March 2000, the European council of Lisbon highlighted the importance of companies' social responsibility

with regard to the most optimal practices for via life learning, organisation of work, equal opportunities, social integration and viable growth. The approval of European Union strategy in favour of the sustainable development, decided by the European Council in Getenborg (June 2001), as well as the publication of green book in July 2001 aiming at the incitement of public debate for the determination of CSR and its promotion in European and international level, constitute important steps that contributed drastically in CSR evolution. Activities of promotion however have also taken place from international organisms, such as the OECD (Organization for Economic Cooperation and Development) that gave the governing lines for the multinational companies (Guidelines For Multinational Enterprises), and the WBCSD (World business Council for Sustainable Development) constituted from 175 international companies that is working for the maintenance and distribution of economic growth, ecological balance and social progress (Commission of the European Communities, 2002). It is also important to mention the existence of a CSR network in Greece, with the participation of companies, with the objective to reach the achievement of the aforementioned aims.

Despite the dissemination of CSR as an institution that can improve the operation and the public image of enterprises, there were also several decriers according to which application of social responsibility practices decrease the economic competitiveness of enterprises. Thus a conflict began between the defenders of CSR and those who have a negative reaction towards its application. The following arguments constitute an example of this conflict (Davis and Blomstrom 1975, Davis et al 1980, Laurence et al 2005):

### *Arguments for Corporate Social Responsibility*

- Balances corporate power with responsibility.
- It discourages the interference of the state, offering flexibility in the decision-making process
- Promotes long-term profits for enterprises
- Functioning on the base of social-political principles, the enterprise becomes a member of the environment in which it is activated
- "Let's permit enterprises to try, probably the ideas will be effective, besides all other institutions have been already tested"
- The problems can turn into profits, through environment protection activities to cut down on energy and resource expenses

- The constantly modified needs and expectations can be traced today in the improvement of the social system
- Prevention is better than cure, since any delay in the identification of problem existence will result in increased time and cost required for their resolution

#### *Arguments against Corporate Social Responsibility*

- Lowers economic efficiency and enterprise profit.
- Imposes unequal cost among competitors
- The society will suffer the cost of any enterprise social contribution
- Imposes hidden costs transferred to the stakeholders.
- It can lead to failure taking into consideration that it creates requirements for social qualifications
- CSR represents the enterprise, not the individuals that make it happen
- It cannot be measured explicitly, becoming thus a potential exploitation parameter
- The society's partial-only-support of enterprise social responsibility activities

It is obvious that the side opposing to the application of CSR promotes the adoption of a more conservative profile compared to the enterprises that appear to agree with modern approaches wanting them allies in the effort for social growth and prosperity. It should not remain without any comment that the spreading of CSR principles emanated from the reaction against the self-centered attitude of enterprises, where the focalisation of their operations in the creation of wealth caused severe reactions followed by intervention from the part of the state.

*The following section constitutes a characteristic example of approach of an enterprise in the current season:*

... Companies have therefore lost the right of "their private asylum" when the enterprise sector was publicised to a large extent....Society requires more revelations....Enterprise interests cannot be separated from the interests of society in general.... (Dunstan, 1982)

The enterprises therefore cannot function isolated from the wider social environment. The need for more revelations and transparency in the way they operate, constitutes the initiation for the assumption of social responsibilities and the application of

social practices. It is therefore righteous to support that modern enterprising success is based on the significance of a triple approach (triple bottom line) according to which in order to have a viable enterprise it should be economically stable, minimise any environmental repercussions and act taking into consideration any social expectations. According to the aforementioned opinions, the application of corporate social responsibility reflects the described approach, since it results in the creation of "Win to Win" method where profit exists for both sides.

What does Corporate Social Responsibility therefore represent? Does its application have as a unique aim the voluntary offer of enterprises aiming at the improvement the social and environmental conditions or does it also constitute a part of an enterprising strategy for long-lasting profit and growth? Potentially the answer is to be found somewhere in-between; nevertheless no precise definition has so far been reported in the international bibliography that would represent explicitly CSR content.

### **3. Measuring the corporate social responsibility**

One of the main issues regarding CSR is the way to measure it. As any fair businessman would say, how can you measure something if you can't properly determine it? (Greenfield, 2004). Each company, providing her own approach towards CSR practise, proceeds in the syntax of accounting-financial reports without the existence of specific models. This action can often create confusion and doubts for their validity. The problem is therefore created from the very beginning: what is the quantity that should be measured?

Several proposals have been examined occasionally concerning the effort to measure CSR, mainly through the syntax of accounting and financial reports that present the total social work of enterprises in the internal and external environment of their operation. Few of the methods that were applied and proposed for the measurement of CSR are presented below:

- The inventory method that was used by the General Mills Inc. in 1972 as the initial step of a social assessment procedure (Hunt, 1974).
- The method of David F. Linowes (1972) according to which the periodical training of a Socio-economic Functional Situation is forecasted.
- The Electoral method that was based on the use of questionnaires and was used by the French

company Singer in 1973 (Rey, 1978). The conclusion of this methodology was the syntax of socio-economic balance-sheet.

- The method of Ralf W. Estes (Anderson, 1978), (which is a “cost – benefit” method). Main objective of this method is to create complete and valid information that could be used in order to maximize the clean profit.

Apart from recovery of the appropriate information for CSR measurement, it is of equal importance to determine the individuals considered suitable for the assumption of such responsibilities. Recently a large number of accountant offices offered to function as independent institutions, offering services of supervising the companies alleged to apply social responsibility practices. Dara O’ Rourke, MIT professor, was invited to attend an accountant team of PriceWaterhouseCoopers, during an inspection of NIKE installations. Unfortunately she discovered significant errors in the applied methodology (Greenfield, 2004).

The existence of the previously mentioned problems is considered of utmost importance, since there is no guarantee for the objective assessment of implicated information. At the same time CSR decriers strengthen their case against social responsibility practice.

#### **4. Enterprises and local self-government**

Enterprises are a very important institution of today’s society. Representing all the companies and industries of each country, they co-exist in the general structure provided by other institutions such as religion, politics and laws, the army, environment, family, culture and education. It is considered an institution since their importance as well as their values has become accepted as a cornerstone of society. It is considered social because it is formed by teams of individuals that work for aims compatible with the aims of our society (Stade, 1975). Consequently, the interference of enterprises in social policy issues starts from the beginning of their existence.

The communication of the enterprises with the local community in which they reside is considered positive since such procedures result in profit for both sides through a relation of interdependence. The companies contribute in the communities providing job opportunities, wage, social benefits as well as taxes. On the other hand, companies depend

from the stability and prosperity of the local communities. The intimacy of companies with the local institutions, traditions and advantages of the local environment, constitutes an investment from which they can benefit (Grand Thornton magazine, 2003). This interdependence is particularly intense in urban regions where the problems of cities have an important effect on enterprises, which can intervene assisting in their prevention (McFarland, 1982).

The enterprises along with the local communities constitute a part of an interaction system that contributes in the perpetuation of CSR according to the type of the enterprise, the environment that it functions, the social situation and the requirements and habits of the region (Marina de Senarclens, 1982). The degree of interaction should be examined in order to realise whether such revelation of information and activation of the two parts exists, aiming at the emergence of corporate social responsibility.

#### **5. Methodology of research**

The present research was designed with the purpose to look for information about the presentation of the CSR through a collaboration between the businesses and the municipalities in which they are based. The municipalities that the research is about belong to the prefecture of Thessaloniki (a city located in northern Greece). From their total, a sample of 20 municipalities was selected in which there is evidence of business activity from large-scale, medium-scale and small-scale businesses. In order to obtain information which could help in deriving the results, a questionnaire was developed with 16 questions whose content concerned the activity of these businesses as well as the activity of the municipalities and the collaboration between the two parties. The questionnaires were administered to the authorities of the municipality who were in the position to forward them to those who knew the information contained in the questionnaires, after giving them necessary guidelines and line of direction for how to complete them. The exchange of information for clarifying certain points between the researchers and the municipalities for the remaining directions and comments was deemed necessary. As it was evident later on, this course of action proved to be very useful because there were some questions, whose clarification led people to complete the questionnaires correctly. In many cases there was collaboration between the different departments of

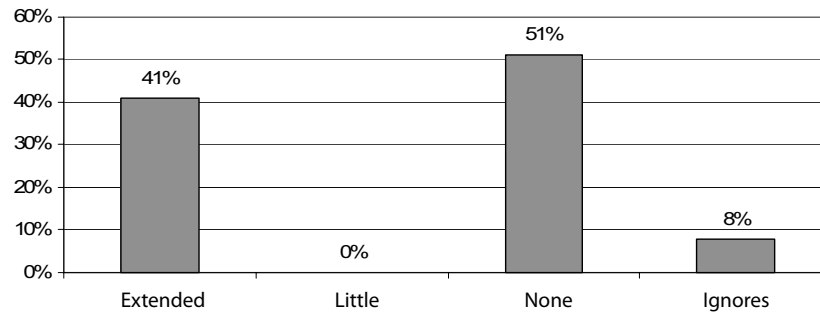


FIGURE 1 Municipalities activation in collaboration issues with enterprises.

the municipality in order to provide answers which were based on subjective criteria. During the collection of the questionnaires, a necessary requirement for obtaining the whole picture of the present situation concerning the relations between the businesses and the municipalities was to have some contact and discussion with the main boss for how to write up the questionnaires. It should be noted that the completion of the questionnaires as far as the municipalities is concerned, was made with great willingness and interest for the results of the research.

## 6. Results and annotation of research

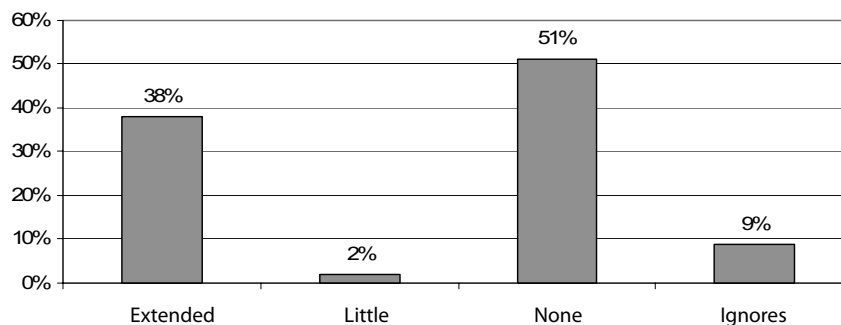
The first part of the research refers to the willingness, to the effort and the actions of the municipalities that are geared towards fostering communication with businesses. Through the results of this research it is intended to find out whether there is an interest and the infrastructure for achieving such a goal. The content of the questions which were chosen for this purpose contain information which reveal the interest of the municipalities to develop a collaboration with the businesses, for taking action in this domain as well as caring for the necessary infrastructure works which exist for this purpose.

An initial investigation of the interest that the municipalities express for developing cooperation with the business, it is revealed that there is a strong interest both for the communication and the collaboration point of view. The percentage which represents this total is 94%, while the remaining 6% supports that the municipalities do not wish to have a contact with the businesses for reasons that have to do either with communication because they are not in the position to define the most appropriate ways of how to approach them or because they show disinterest towards them, possibly because they have not realized the position that businesses have today

as power agents for the development of social and environmental policy.

The activity of the municipality for the achievement of this goal was examined next through actions of fostering cooperation with the businesses as well as through departments that have been created so as the cooperation of the two parties to be smooth, within a well-organized environment. So, besides the willingness which has been expressed from the municipalities for the existence of essential cooperation with the businesses, the necessary requirements for achieving this goal also play a very important role. These may be the existence of specific employees whose main responsibility would be to foster the relationship between the municipality and the businesses, until special departments within each municipality are created for this purpose. According to the answers provided by the people who have been asked, the results that have been compiled are presented in figure 1.

Despite the interest of the municipalities to develop relationships of cooperation with the businesses, the analysis of the responses given shows that the effort of the municipalities in matters of organization and infrastructure may potentially not be so sufficient. As the results that have presented show, the strong motivation for taking actions in matters of cooperation and communication with the businesses is exhibited at a percent rate of 41%, which is quite low if we consider the social and environmental benefits that could come out of such a beneficial communication between the two. The main concern of the municipalities and of the communities is to promote the social and economic interests as well as the cultural and mental interests of the people living in them (Municipal and Communal Code, 1995). How can we however get positive results if we do not have the necessary infrastruc-



**FIGURE 2** Collaboration and dissemination of information from enterprises to municipalities.

ture and requirements, the basis of which should potentially be set on a table by the central government, so as to achieve cooperation with the main medium of wealth such as the businesses? The lack of cooperation with the businesses can only create a developing cost and as one can conclude from the above results, this mounts to 51%. In essence, this percentage reflected to a great extent to the cost of living of the people living in the communities with environmental, social and cultural consequences.

On the other hand, the businesses, besides wanting to achieve profit should care for the proving a better quality of life for the communities in which they act, but also to maintain a moral behaviour towards the people and the environment. Having this line of thinking, it was considered necessary to examine to what percent the municipalities receive this interest, through questions of environmental, social and cultural interest. From the results obtained, and always in accordance with the regional self-governments, businesses express their role of social responsibility a percent rate of 38% (Figure 2). According to the evidence that the municipalities have, their involvement in the support of the community is small, while knowledge of the information through accounting and economical or through quality reports, especially as far as the protection of the environment is concerned is next to nothing.

Clearly, the small percent of interest which is being expressed should cause concern for the degree to which they offer at the regional self-government and be the reason to carry out research for discovering the reason for why they did not take any course of action. The jurisdiction of the municipalities in controlling the actions of the businesses based on their behaviour towards the environment is small and basically unclear. Yet, how are the businesses going to maintain a reliable image for their opera-

tion and how are they going to win the trust of the regional self-government and subsequently of its people? Is the interference of the state the only solution or is there an alternative choice for making them willing to take some course of action in matters of environmental policy? Every business should support one part of the development of the community in which it is based. This support should be provided not only through grants for supporting certain events, but also through knowledge of information of the greater social scope through formal logistic and economic or through quality situations.

The release of the social report should primarily be considered a result of large scale businesses which expand their work throughout the world but also at different parts of the country in which they are based, realizing that, based on the conditions that exist in each region, the adjustment is deemed necessary so as to be able to survive and develop in the long-term. This is to some extent justified from the results of the research which was conducted to control the scale of the businesses (Large, Medium or Small-scale) which offer social and environmental work to the municipalities of Thessaloniki. Indeed, the actions of the large-scale businesses seemed to be more intense, possibly reflecting the sense of responsibility that these have towards the public (Figure 3).

The large-scale businesses are primarily the ones that apply the social practices and in fact the ones who primarily release the social review report. Realizing that the application of CSR acts like a measure of guarantee for their progress, they consider that failing to be what we would call someone as 'the good corporative citizen' could destroy the careers of business executives, organizations, and the shares allocated to all the owners. Showing greater sensitivity to the current changing values and inte-

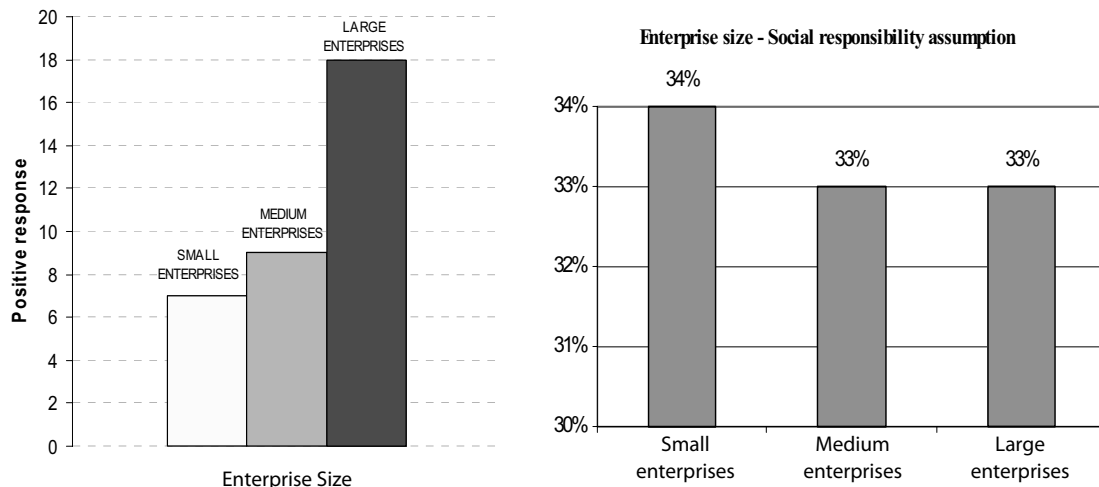


FIGURE 3 Size of enterprises activated in CSR practice.

grating the prospects of the CSR in strategic decisions has become necessary (Werther and Chankler, 2005). It is known that in Greece there are primarily medium-scale and small-scale businesses in which the message that they can benefit from directing themselves towards adopting the CSR has not yet been passed on to them. The main problems that the media face in this field are the insufficient sensitivity and the limited resources. It is therefore necessary to study specific matters of the CSR that have to do particularly with the media and which foster the spread and the exchange of correct practices, the joined media forces and their support organizations to become familiar with the notion of CSR, to help the cooperation between the big businesses and the media and the media to be more sensitive towards the effect that their actions have in the developing countries (Committee for the European Communities, 2002). In this way, it is possible that there will be a bigger participation of the businesses and a larger spread of the notion of CSR.

Sticking to these practices of social responsibility that is being reflected in the accounting and financial reports reveals that the total social work produced by the businesses. Those who are inside or outside of the business and who are interested in obtaining information through this report and use it in order to make decisions about possible investments or consumption. Considering the importance of their release from the businesses and the importance of letting the municipalities become aware of its contents one goal of this research was to ascer-

tain to what extent is there such a function in the municipalities that were under study. The responses that we gathered were primarily negative. There is no knowledge provided about the work of the businesses to the citizens of the regional self-government through publishing accounting and financial reports at some regional magazine, while those responsible for the community functions lack the knowledge of the businesses that are involved in these matters.

Compiling accounting and financial sheets arose out of the need to release information to the public. This is where the whole social work of the businesses is being traced, which is something that ought to be a subject of interest for everyone. Setting the limit of the region covered by the municipality, the first and foremost interest and knowledge of the social information should be shared by those mainly involved in the municipality activities and then we should have the transport of this information to the people. As already mentioned, there is a mutual interrelationship between these two parties. Yet, how do we achieve the goal for social development and prosperity if there is no knowledge? This lack of knowledge is due to both the limited application of the CSR as well as to the limited spread it has. This is being confirmed by the July 2004 research of the Institute of Communication in which it was found that Greece has the greatest percent of citizens who are ignorant as far as their knowledge of the social responsibilities of businesses as well as the smallest percent of responsible consumers (Damoulianou, 2004).

The information knowledge is therefore judged to be necessary. Subsequently, the contribution of the municipalities and of the businesses through this new relationship of cooperation becomes decisive. There should be initial knowledge of the work of the businesses from the municipalities either from their own demand for collecting evidence or through the interest expressed by the very same businesses through submitting their work towards them. The evidence mentioned could have the form of a social balance sheet with elements that have to do with responsible policies of protection of the environment, protection of the customer for safe products, educational programmes as well as activities that have a humanitarian and a cultural character. Later on, the knowledge of these elements through their publication in press by the municipalities could trigger the interest of the citizens so as to become more responsible and eclectic in their choices and in their investment decisions.

Of course, in order for all these mentioned above to become reality, there needs to be organization from both parties. From their point of view, the municipalities need to create a separate unit for handling the communication and the support of the businesses. At this point, it should be mentioned that there was some initiative from the municipalities in the past for the creation of such units whose action, among others, would be the support of medium-scale businesses, but the lack of right organization led to their insufficient operation. It could be possible that the interference of the government with programmes that support this initiative is necessary. Its indirect involvement could bring particularly positive results in achieving the aforementioned goals. The businesses on the other hand, should defend their social character through a series of actions and good practices. The comments received about being a burden to the environment as well as being indifferent in some instances about the communal activities should gradually stop. It is evident that all of the above require at a first instance the creation of goals for the social development and prosperity followed by their success, both in terms of function and in terms of organization.

Setting financial goals has never been easy, yet setting social goals is even harder (Filer, 1981). The modern business realizing the expectation of the society wished to respond with success. The questions set in its effort to undertake this responsibility are:

how far should it go? How fast should it become better? What priorities should it set and how is it going to count the cost of the benefit that will incur? (Kapnick, 1981). The answers depend on how serious the public is going to be in dealing with such expectations. Let us hope that the businesses will deal with this need positively for corporate social responsibility having as allies the regional self-government and the state.

## 7. Conclusions

In the framework of the present paper a research on the Corporate Social Responsibility in Thessaloniki (Northern Greece) has taken place, using information obtained from the completion of questionnaires from 20 Municipalities. More specifically the collaboration of municipalities with the enterprises was investigated, in the light of the obtained information regarding interaction between enterprises and local society of each municipality, aiming at the emergence of their social and environmental offer.

The results of the investigation revealed that despite the desire for a productive collaboration, at least from the side of the municipality authorities, such interaction does not seem to exist in an important degree. The lack of potentially suitable infrastructures and required conditions in the municipalities, along with the insufficient information of enterprises on issues concerning corporate social responsibility, has as a consequence the decreased activation of enterprises in the sector of social offer.

It is deemed essential that all required initiatives should be assumed from the involved institutions and enterprises in the close future, in order to achieve a smooth co-existence of enterprises and local society with better terms and reciprocal profits.

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- International perspective with Securities & Investment Institute (SII) prestigious name.
- Practical and Analytical expanding skills in all related industry sectors.
- Candidates gain international recognition and acceptance as career professionals.
- The most complete certificate in investment management offered in Greece.

#### How the Certificate benefits your organization:

- Expands company's Know-How and demonstrates commitment in investing on human capital.
- Certified executives provide a competitive edge against competition and show to clients the importance the organization places on investment management.
- Recognized from all major financial institutions worldwide facilitates international business.
- Enhances organization's potential for new business development.

#### Examination arrangements for Athens or Thessaloniki offered for the following SII Certificates:

- Certificate in Securities
- Certificate in Derivatives
- Certificate in Securities and Fin. Derivatives

- Certificate in Investment Management
- Certificate in Corporate Finance.

#### Some of the companies using SII certificates:

- Bank of America
- HSBC
- CITIBANK
- Brewin Dolphin
- Goldman Sachs
- JP Morgan
- Liberty Ermitage UK
- Close Wealth Management
- Royal Bank of Scotland
- Collins Stewart (CI) Ltd
- Smith & Williamson Investment
- Credit Suisse Asset Management
- Deutsche Bank
- UBS Global Asset Management

#### The Training Provider

**H&F Analysis** through continuous training development and cooperation with Securities & Investment Institute has acquired the SII's Accredited Training Provider status in Greece.

H&F Analysis' instructors are chosen to be highly qualified, market oriented practitioners with hands-on experience, well acquainted with SII's culture and methods.

H&F Analysis follows interactive teaching methods with the support of high-tech infrastructure and has so far achieved well above average passing rates for attending candidates.

On-site training for own company employees offered

#### Membership - Join the SII Athens Branch

The "SII - Athens Branch" for members residing or working in Greece was created in February 2006. Join the SII society and enjoy the benefits of a prestigious and well organized society of more than 16,000 members. ([www.sii.org.uk](http://www.sii.org.uk))

#### Contact Details:

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#### ΛΗΨΗ ΚΑΙ ΔΙΑΒΙΒΑΣΗ ΕΝΤΟΛΩΝ

Επιβεβαιώνουμε την Εκτέλεση της εντολής σας εντός 1 λεπτού σε market εντολές

Πλατεία Βάσως Κατράκη 6, 166 75 Γλυφάδα, τηλ. 210 89 85 545

Fax: 210 89 85 544, e-mail: [actstock@otenet.gr](mailto:actstock@otenet.gr)



## **1<sup>st</sup> International Conference in Accounting and Finance**

**UNIVERSITY OF MACEDONIA  
DEPARTMENT OF ACCOUNTING AND FINANCE**

31 August - 1 September 2006,  
University of Macedonia, Thessaloniki

### **CONFERENCE TOPICS**

The broad topics include:

**Finance:** Corporate finance, asset pricing, derivatives, market microstructure, financial intermediation, international finance, etc.

**Accounting:** Financial accounting, disclosure, valuation, forecasting, earnings management, strategic cost, corporate governance, international accounting, etc.

### **CONFERENCE WEBSITE**

<http://eos.uom.gr/~icaf>

*Conference Secretary:* Ipatia Konstantinidou  
Department of Accounting & Finance  
University of Macedonia  
N. Egnatia Str. 156, 54006, Thessaloniki, Greece  
Tel: 0030 2310 891687, Fax: 0030 2310 891678  
E-mail: [icaf@uom.gr](mailto:icaf@uom.gr)

### **VENUE AND CONFERENCE DATES**

The Conference dates are 31 August-1 September 2006, University of Macedonia, Thessaloniki, Greece

### **ORGANISING COMMITTEE**

Ioannis Lazaridis, Professor (University of Macedonia)  
Annita Florou, Lecturer (University of Macedonia)  
George Michalopoulos, Lecturer (University of Macedonia)  
Ageliki Dimopoulou (University of Macedonia)  
Dimitris Ginoglou, Associate Professor (University of Macedonia)  
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